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Prosociality, inhibitory control, social status, and group norms in children and adolescents: psychological and socioecologica perspectives

Prosocialidad, control inhibitorio, estatus social y normas de grupo en niños y adolescentes : perspectivas psicológicas y socioecológicas

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PRESENTADA POR

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TESIS DOCTORAL

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DECLARACIÓN DE AUTORÍA Y ORIGINALIDAD DE LA TESIS PRESENTADA PARA OBTENER EL TÍTULO DE DOCTOR

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(Prosocialidad, control inhibitorio, estatus social y normas de grupo en niños y adolescentes: perspectivas psicológicas y socioecológicas)

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Summary

Sociality (group-living) and prosociality (acting to benefit others) are ubiquitous in the animal kingdom. However, humans have been claimed to be uniquely ultra-social and ultra-prosocial (or ultra-cooperative). In fact, the success of humankind is claimed to be due to our species' ultra-sociality and this rests heavily on our hypertrophied prosociality. Prosocial (and antisocial) behaviours permeate every corner of people's everyday life, which is inevitably and strongly social, and have an significant impact on the individuals' welfare, health, psychosocial adjustment, and school and career success. A better understanding of the proximate (mechanistic) and the ultimate (evolutionary) processes that craft and fuel prosociality has become a major objective tackled by research programmes from numerous disciplines within the social and the natural sciences that deal with foundational and applied research questions. The approach adopted in the research reported here is mainly informed by developmental psychology, cognitive psychology and comparative (and evolutionary) psychology.

The present research aimed to probe prosociality by studying (1) some of its *psychological foundations* in young children and (2) its role in the *socio-ecological context* of peer relations in young adolescents' groups. The current work consisted of two studies that tackled a common theme, prosociality, approached from two different but complementary perspectives. *Study 1* was an experimentally investigation of the relation between one form of costly prosociality, namely, altruistic sharing, and one component of executive function, namely, inhibitory control, in 4 to 6 year-old young children. The general hypothesis addressed here was that altruistic sharing would be positively associated with trait inhibitory control. *Study 2* was a correlational investigation of the effect of descriptive behavioural group norms for prosocial behaviour and for aggression, and a group's network density, on the negative impact of

peer victimization on likeability in 13 year-old young adolescents. The general hypothesis tested here was that group norms for prosocial behaviour would have a greater moderating effect than group norms for aggression and that the group norms of most visible peers would be more influential than the group norms of entire classrooms and the group norms of most likeable peers on the negative impact of peer victimization on social liking. Both studies also tested several other more specific assumptions and hypotheses.

Participants in *Study 1* were 72 4 to 6 year-old children from Colombia. Three executive functions were assessed: *inhibitory control* with the Day-Night Task, *working memory* with the Eight Boxes Scrambled Test, and *cognitive flexibility* with the Dimensional Change Card Sort. *Altruistic sharing* was assessed with a one-shot, anonymous Dictator Game (DG). 'Dictators' were endowed with 10 candies. Participants in *Study 2* were 6,600 13 year-old young adolescents from 269 classrooms in 81 secondary schools in Spain. Three categories of group-based descriptive norms (i.e., the entire *classroom*, the *subgroups* of most visible and most liked peers), two measures of peer-reported status (i.e., *visibility* and *likeability*), and two measures of peer-reported behaviours (i.e., *prosocial* behaviour and *aggression*) were assessed. The classrooms' network *density* was also evaluated. Given the nested design of Study 2 data, multilevel hierarchical analysis was used to test the effects of the several potentially moderating variables (and its interactions) on the negative relation between peer victimization and likeability.

The analyses yielded the following results:

1. In the one-shot Dictator Games (DGs) run in Study 1, only 44% of the 4 to 6 year-old young participants did donate to their anonymous and unrelated partners at least one of the 10 candies (rewards) they had been endowed with.

2. The average allocation of Study 1's children in the DG was of 1.6 candies (i.e., 16%). This figure includes the zero contributions of the 56% non-altruists and the non-zero contributions of the 44% altruists. If we relax the criterion and only consider the average donations of altruists (those who at least allocated one candy), i.e., 3.3 or 33%, we see that this is still far from a fair split (50%).

3. Four to six years-old children who scored higher on trait inhibitory control, assessed with the Day-Night Task, were found to give away more candies in a one-shot, anonymous Dictator Game.

4. Study 2 tested the relation between two *peer status* constructs, i.e., *visibility* and *likeability* in 13 year-old young adolescents, and found that they were uncorrelated or poorly correlated.

5. Study 2 found that *prosocial behaviour* was negatively associated with *aggression* and *victimization*, and that these two *behavioural categories* were in turn positively associated in 13 year-olds.

6. Study 2 reported that *aggression* was positively related to *visibility*, whereas *prosocial behaviour*, in contrast, was positively associated with *likeability* in the large sample of young adolescents.

7. The key assumption in Study 2, namely, that *peer victimization* would have a negative impact on *likeability* in the young adolescents of the study, was strongly supported, both at the individual, and at the classroom level.

8. Study 2 showed that when aggression was normative in the *subgroup of most visible* peers, victimized peers were less disliked, that is, the behavioural norm for aggression of the subgroup of most visible (or popular) peers weakened the negative impact of individual victimization on likeability. In contrast, when prosocial behaviour

was prevalent in the *classroom* or in the *subgroup of most visible* (popular) peers, victimized peers were better accepted.

9. Study 2 tested and confirmed the prediction that *visibility* behavioural norms would be more influential than *likeability* behavioural norms in moderating the negative relation between peer victimization and likeability in young adolescents, as the aggression and the prosocial *visibility* norms attenuated the negative relation between likeability and victimization, whereas neither the aggression *likeability* norm, nor the prosocial *likeability* norm had any significant effect on the likeability-victimization negative association. That is, high levels of prosocial behaviour and aggression by visible (popular) peers, but not by liked peers, weakened the level of disliking of highly victimized peers.

10. Study 2 tested and partly confirmed the hypothesis that *prosocial* norms might have a greater effect than *aggression* norms on the likeability-victimization negative link found in this study and in previous research, as whereas only the *aggression* visibility norm influenced this link, however, both the *prosocial* norm of classrooms as well as the *prosocial* norm of the subgroup of most visible peers did have a weakening effect on the negative impact of victimization on likeability.

11. Study 2 investigated the relation of a group's *network density* and the negative relation of peer victimization to likeability. Victimized peers were better liked in groups made of multiple, differentiated subgroups or cliques of classmates (i.e., low density). Highly victimized peers were less disliked in classrooms with a high prosocial norm and a low density and in classes with low density and where the subgroup of most visible (or popular) peers had a high prosocial norm.

Taken together, the present research adds to our understanding of the psychological foundations of prosociality in young children, and of the role of prosocial behaviour

(and aggression) in the socio-ecology of peer groups of adolescents. More specifically, the findings reported in the current work indicate that altruistic behaviour and fair allocation of resources, as assessed with a Dictator Game, are underdeveloped in 4 to 6 year-old children, and that the altruistic sharing of resources is positively associated with trait inhibitory control at this young age. They also reveal that prosocial (and aggression) norms, mainly of the subgroup of most visible (or popular) peers, and the classroom's network density moderate the negative impact of peer victimization on likeability. These findings strengthen and expand our understanding of peer relations, social status and the behaviour-status relations in groups of 13 year-old adolescents. The theoretical and applied implications of these results are discussed in the context of the research agendas of several disciplines, especially developmental psychology and comparative psychology. Strengths, limitations, and future directions of the present work and of this field of study are also addressed.

Resumen

El comportamiento social (la vida en grupo) y la prosocialidad (actuar en beneficio de los demás) son omnipresentes en el reino animal. Sin embargo, los seres humanos son excepcionalmente sociales y ultra-prosociales (o ultra-cooperativos). De hecho, se afirma que el éxito de la humanidad se debe a la ultra-socialidad de nuestra especie y esto se basa en gran medida en nuestra prosocialidad hipertrofiada. Los comportamientos prosociales (y antisociales) impregnan cada rincón de la vida cotidiana de las personas y tienen un impacto significativo sobre el bienestar, la salud, el ajuste psicosocial y el éxito escolar y profesional de los individuos. Una mejor comprensión de los procesos próximos (mecanicistas) y últimos (evolutivos) que crean y sustentan la prosocialidad se ha convertido en uno de los principales objetivos de los programas de investigación de numerosas disciplinas dentro de las ciencias sociales y naturales que se ocupan de cuestiones relacionadas con investigación básica y aplicada. El enfoque adoptado en esta investigación se basa principalmente en la psicología del desarrollo, la psicología cognitiva y la psicología comparada (y evolucionista).

El objetivo de la presente investigación fue (1) investigar la prosocialidad mediante el estudio de algunos de sus *fundamentos psicológicos* en niños pequeños y (2) estudiar el papel de la prosocialidad en el *contexto socio-ecológico* de las relaciones entre pares en grupos de adolescentes jóvenes. El trabajo comprendió dos estudios que profundizaron en un tema común, la prosocialidad, abordada desde dos perspectivas diferentes pero complementarias. El *Estudio 1* fue una investigación experimental sobre la relación entre una forma costosa de prosocialidad, como lo es el altruismo en la distribución de recursos materiales, y un componente de la función ejecutiva, a saber, el control inhibitorio, en niños pequeños de 4 a 6 años de edad. La hipótesis general que se abordó fue que el comportamiento altruista se asociaría positivamente con el control

inhibitorio. El *Estudio 2* fue una investigación correlacional y abordó el efecto de las normas descriptivas de comportamientos prosociales y agresivos, además de la densidad de la red del grupo, sobre el impacto negativo de la victimización sobre la aceptabilidad (‘likeability’) en adolescentes jóvenes de 13 años. La hipótesis general contrastada en este segundo estudio fue que las normas de grupo para el comportamiento prosocial tendrían un mayor efecto moderador que las normas de grupo para la agresión y, a su vez, que las normas de grupo de los compañeros más visibles (o populares), tendrían más influencia que las normas de todo el grupo y que las normas de los compañeros con mayor aceptabilidad sobre el impacto negativo de la victimización sobre la aceptabilidad. Ambos estudios contrastaron además otros supuestos e hipótesis más específicos.

Los participantes en el *Estudio 1* fueron 72 niños de 4 a 6 años de edad de Colombia. Se evaluaron tres funciones ejecutivas: el *control inhibitorio* con la Tarea del Día y la Noche, la *memoria de trabajo* con la Prueba de las Ocho Cajas Revueltas, y la *flexibilidad cognitiva* con la Clasificación de Tarjetas de Cambio Dimensional. El *comportamiento altruista* se evaluó con el juego del Dictador (JD), que se jugó una sola vez y de forma anónima. Los 'Dictadores' recibieron 10 caramelos. En el *Estudio 2* participaron 6.600 adolescentes de 13 años de 269 aulas en 81 escuelas secundarias de España. Se evaluaron tres categorías de normas descriptivas definidas en función del tamaño de los grupos (*toda la clase*, el subgrupo de los compañeros *más visibles* y el subgrupo de los *más aceptados*), estas dos últimas medidas corresponden a los constructos sociométricos de visibilidad y aceptabilidad. A través de informes de los participantes (los pares) se evaluó también el comportamiento *prosocial* y *agresivo* de cada miembro del grupo. Finalmente se evaluó la *densidad* de la red social en el aula. Dado el diseño anidado de los datos del *Estudio 2*, se utilizó el análisis jerárquico

multinivel para analizar los efectos de las diversas variables potencialmente moderadoras (y sus interacciones) sobre la relación negativa entre victimización escolar y simpatía.

Los análisis arrojaron los siguientes resultados:

1. En el Juego del Dictador (JD) utilizado en el *Estudio 1*, sólo el 44% de los participantes entre de 4 y 6 años de edad, donaron a sus parejas anónimas al menos uno de los 10 dulces (recompensas) que habían recibido.
2. La donación media encontrada en el *Estudio 1* fue de 1,6 caramelos (es decir, el 16%). Esta cifra incluye las contribuciones nulas del 56% de los no altruistas y las contribuciones del 44% de los altruistas. Considerando solo las donaciones medias de los altruistas (aquellos que al menos dieron un caramelo), la asignación media fue de 3,3 dulces, es decir, el 33%, lo cual está todavía lejos de una división equitativa (50%).
3. Se encontró que los niños de cuatro a seis años que obtuvieron una puntuación más alta en la prueba de control inhibitorio (la Tarea del Día y la Noche) donaron más caramelos en el JD.
4. El *Estudio 2* encontró que la *visibilidad* y *la aceptabilidad*, dos constructos asociados con el *estatus social*, estaban muy débilmente correlacionados en la muestra de adolescentes de 13 años.
5. El *Estudio 2* encontró que el *comportamiento prosocial* está negativamente asociado con la *agresión* y con la *victimización*, y que estas dos categorías de comportamiento están a su vez asociadas positivamente en adolescentes de 13 años.
6. El *Estudio 2* mostró que la *agresión* estuvo positivamente relacionada con la *visibilidad*, mientras que el *comportamiento prosocial*, por el contrario, estuvo positivamente asociado con la *aceptabilidad* en la muestra de jóvenes adolescentes.

7. El supuesto clave del *Estudio 2*, a saber, que la *victimización* de los pares tendría un impacto negativo sobre la *aceptabilidad* en los adolescentes, fue significativamente respaldado, tanto a nivel individual como grupal (el conjunto de las clases).

8. El *Estudio 2* mostró que cuando la agresión fue normativa en el subgrupo de pares *más visibles*, los pares victimizados fueron menos rechazados, es decir, la norma para la agresión del subgrupo de pares más visibles (o populares) debilitó el impacto negativo de la victimización sobre su aceptabilidad. En contraste, cuando el comportamiento prosocial fue prevalente en el aula o en el subgrupo de compañeros *más visibles* (populares), los compañeros victimizados fueron mejor aceptados.

9. El *Estudio 2* probó y confirmó la predicción de que las normas conductuales de *visibilidad* tendrían más influencia que las normas conductuales de *aceptabilidad* en la moderación de la relación negativa entre victimización y aceptación en adolescentes jóvenes, ya que las normas de agresión y prosocialidad de los *más visibles* atenuó la relación negativa entre aceptación y victimización, mientras que ni la norma prosocial ni la agresiva de los *más aceptados* tuvo efecto significativo sobre la asociación negativa entre aceptación y victimización. Es decir, los altos niveles de comportamiento prosocial y de agresión por parte de los compañeros visibles (populares), pero no por parte de los compañeros más aceptados, debilitaron el nivel de aversión sufrida por los individuos altamente victimizados.

10. El *Estudio 2* confirmó parcialmente la hipótesis de que las normas *prosociales* podrían tener un efecto mayor que las normas de *agresión* sobre el vínculo negativo entre aceptación y victimización encontrada en este estudio y en investigaciones anteriores. Mientras que sólo la norma de visibilidad de la *agresión* influyó sobre esta asociación, tanto la norma *prosocial* de todo el grupo de clase como la norma *prosocial*

del subgrupo de pares más visibles tuvieron un efecto debilitante sobre el impacto negativo de la victimización sobre la aceptación.

11. El *Estudio 2* investigó la relación entre la *densidad* de la red de un grupo y la relación negativa entre la victimización de los pares y su aceptación. Los compañeros victimizados fueron más aceptados en grupos formados por múltiples subgrupos diferenciados de compañeros de clase (es decir, de baja densidad). Los compañeros altamente victimizados fueron menos rechazados en aulas con una alta norma prosocial y una baja densidad y en aulas con baja densidad y donde el subgrupo de compañeros más visibles (o populares) tenía una alta norma prosocial.

En conjunto, pues, la presente investigación constituye una contribución a la comprensión de los fundamentos psicológicos de la prosocialidad en niños pequeños y del papel del comportamiento prosocial (y la agresión) en la socio-ecología de grupos de adolescentes. Más específicamente, los hallazgos descritos en el presente trabajo indican que el comportamiento altruista y la distribución justa de recursos, tal como se evalúa con un juego del Dictador, están aún poco desarrollados en niños de 4 a 6 años de edad, y que la distribución voluntaria de recursos está positivamente asociada con el control inhibitorio a esta temprana edad. Los resultados también revelan que las normas prosociales (y de agresión), principalmente del subgrupo de pares más visibles (o populares), y la densidad de la red del aula, moderan el impacto negativo de la victimización de los pares sobre su aceptabilidad. Estos hallazgos fortalecen y amplían nuestra comprensión de las relaciones entre pares, el estatus social y las relaciones entre comportamientos en grupos de adolescentes de 13 años de edad. Las implicaciones teóricas y aplicadas de estos resultados se discuten en el contexto de investigación de varias disciplinas, especialmente la psicología del desarrollo y la psicología comparada.

Finalmente se abordan las fortalezas, limitaciones y direcciones futuras del presente trabajo y el campo de estudio en el que se enmarca.

CHAPTER 1: GENERAL INTRODUCTION, OBJECTIVES AND HYPOTHESES

1..1 General introduction

1.1.1 Stating the problem: sociality and prosociality

Evidence is overwhelming that at any point of time during a person's lifespan, his or her well-being and mental and physical health are inextricably linked to the quality of his or her network of social relationships (Cacioppo & Cacioppo, 2014; Dunbar, 2018; Holt-Lunstad, 2018; Holt-Lunstad, Smith, & Layton, 2010; Loving, Heffner, & Kiecolt-Glaser, 2006; Newman & Roberts, 2013). And social relationships inevitably emerge whenever two (or more) individuals come together and repeatedly engage in interactions that extend over relatively protracted timespans (Hinde, 1997). The dissolution of valuable bonds, the loss of loved partners, or the experience of social rejection are all stressful and socially painful events (Baumeister & Leary, 1995; Coplan & Bowker, 2014; Eisenberger, 2015; Mulvey, Boswell, & Zheng, 2017) that have negative consequences on the incumbent individuals' wellbeing and health, as they are likely to activate sick behaviours (e.g., substance abuse, overeating, reduced physical activity or poor sleep), cause psychological maladjustments (e.g., anxiety, depression, social withdrawal) and externalizing problems (e.g., norm breaking, aggressive conduct), and dysregulate the activity of the neuroendocrine and immune systems (Cacioppo, Hawkley, Norman & Bernston, 2011; Cacioppo, Cacioppo, Capitanio, & Cole, 2015; Eisenberger, Moieni, Inagaki, Muscatell & Irwin, 2017; Hawkley & Cacioopo, 2010; Muscatell & Eisenberger, 2015; Wang, Iannotti & Luk, 2012). In sum, sociality (or group living) has become a critical welfare- and fitness-enhancing condition for humans (and many other nonhuman species for that matter).

However, human sociality is claimed to be unique; in fact, humans are said to be ultra-social (Tomasello, 2014a; see also Wilson & Gowdy, 2015) as its sociality relies heavily on (1) strong interpersonal and interdependent social and emotional bonds (i.e.,

friendships, family ties, in-group partnerships) and on unique forms of (2) prosocial behaviour, and culturally acquired and sharpened patterns of (3) norm compliance, and (4) norm enforcement (Apicella & Silk, 2019; Boyd, 2018; Chudek & Henrich, 2011; Dunbar, 2018; Fehr & Schurtenberger, 2018; Gelfand, Harrington, & Jackson, 2017; Jensen, 2016; Rand & Nowak, 2013; Schmidt & Rakoczy, 2019; Silk & House, 2011, 2016; Tomasello, 2016, 2019).

The present research focuses on one of these building blocks of human ultra-sociality, namely, prosociality (which is also considered to be hypertrophied in our species, e.g., Burkart et al., 2014), although it also addresses and analyses information relevant to the other three. Thus, the present work reckons that most human behaviour takes place within nested or rather networked groups (Bronfenbrenner, 1979; Neal & Neal, 2013), some consisting of individuals who will never meet up or hardly come to know one another (they will remain entirely or largely anonymous throughout), at one extreme, and others comprising individuals who are closely (or even intimately) affectively bonded to and interdependent with one another, at the other extreme (Dunbar, 2018; Tomasello, 2018, 2019). This research also acknowledges that most human behaviour is normative, meaning that individuals are well aware that there are right and wrong ways of doing things, a capacity that emerges rather early in development (Schmidt & Rakoczy, 2019; Tomasello, 2016, 2019). For example, individuals are expected to behave prosocially rather than selfishly, because acting on behalf of others is held to be normative; thus, breaking rather than conforming to this major social norm, especially when it improves one's personal benefit at a cost to your partners in the group is seen as selfish or uncooperative (Baumeister & Bushman, 2013). Lastly, this work recognizes that norm compliance is intensely socially monitored (i.e., policed) and strongly enforced so that norm-breaking (and norm

deviations) can be curtailed (Fehr & Schurtenberger, 2018; Simpson, Willer, & Harrell, 2017; Tomasello, 2016, 2019). Free-riders and non-cooperators risk social exclusion (Baumard, André, & Sperber, 2013; Tomasello, 2016), which is devastating for such an ultra-social species like ours (Baumeister & Bushman, 2013). In sum, if sociality is expected to be beneficial in terms of improved welfare, health and survival, hopefully to everyone in any given group, and indeed it tends to be so even if unequally, and if prosociality is critical to hold group members tightly together, then it does come as no surprise that humans have evolved an additional adaptation-for-cooperation strategy, namely, the so-called altruistic or moralistic (third-party) punishment, which is aimed to enforce cooperation by discouraging group members' selfish behavioural actions and free-riding (Baumard, André, & Sperber, 2013; Boyd, Gintis, & Bowles, 2010; Fehr & Schurtenberger, 2018; Jensen & Tomasello, 2010; Tomasello, 2009).

1.1.2 Defining prosociality

Prosocial behaviour can be defined in various ways, for example, behaviour *intended* to benefit others or, more broadly, behaviour likely to increase the recipient's welfare and fitness (Eisenberg, Spinrad, & Knafo-Noam, 2015; Jensen, 2016). The former definition is more causally oriented (i.e., what *drives* or *motivates* cooperation), whereas the latter is more functionally oriented (i.e., what *effects* it has on the individuals' welfare and fitness, regardless of whether such effects are actually foreseen and intended by the actor). It should also be noted that cooperative behaviour can be proactively or instrumentally used to pursue the attainment of self-serving goals (Boxer, Tisak, & Goldstein, 2004), with the potential benefits spilled over third-parties occurring only as unintended side effects. In anyway, prosociality can be enacted through a variety of acts, including helping, sharing, comforting, and informing (Dunfield, 2014; Eisenberg, VanSchyndel, & Spinrad, 2016; Jensen, 2016), which can actually be more tightly

grouped into the following four categories (Colmenares, in preparation): *sharing material resources* versus *information*, on the one hand, and *helping instrumentally* versus *emotionally*, on the other hand.

Importantly, prosociality can come in several flavours (Hamilton, 1964; Foster, 2011; West, Griffin, & Gardner, 2007a). In general, any action that increases another's welfare or fitness can count as prosocial. In practice, however, prosocial behaviour can be classified as *collaboration* or *cooperation* if both the actor as well as the recipient share the immediate benefits (+/+), *altruism* if the recipient's immediate welfare/fitness is increased while the actor's is lowered (-/+), and *altruistic, prosocial or third-party punishment* if both the actor's and the direct recipient's immediate welfare/fitness is lowered, but that of a third-party is, nonetheless, increased (-/-/+) (Colmenares, 2015).

Although the emphasis has traditionally rested on the benefits obtained only by recipients of prosocial acts, particularly of social and emotional support, cashed out in terms of enhanced well-being and positive health outcomes, more recently a number of researchers have noted that the accrued benefits can actually be mutual (Brown, Nesse, Vinokur, & Smith, 2003; Crocker, Canevillo, & Brown, 2017; Inagaki & Orehek, 2017; Miller, Kahle, & Hastings, 2015; Väänänen, Buunk, Kivimäki, Pentti, & Vahtera, 2005; Vogelsang & Tomasello, 2016). It is important to underscore the fact that much prosocial behaviour is actually collaborative or cooperative, rather than altruistic. Collaboration occurs when two (or more) individuals coordinate their individual (costly) actions to yield collective benefits that will be mutually shared and that cannot be generated and accessed individually (Tomasello, 2014a, 2014b; Warneken, 2018). Collaboration thus involves two (or more) benefactors and two (or more) beneficiaries (Colmenares, in preparation). Cooperation, on the other hand, happens when an individual's prosocial behaviour enhances the two incumbent partners' immediate

welfare or fitness; here there is only one benefactor, but two beneficiaries (the actor itself and the recipient).

The so-called paradox of cooperation has to do with explaining how it is possible that natural selection has designed and favoured 'brains' and 'minds' that maintain altruistic behaviours, in spite of the fact that these jeopardize the altruist's immediate well-being and fitness, or at least put altruists at an immediate disadvantage vis-à-vis those who behave selfishly and deceitfully (i.e., defectors). And this conundrum has long preoccupied both biologists and psychologists who share an interest for uncovering the psychological and physiological mechanisms (i.e., proximate causes) and evolutionary processes (i.e., ultimate causes) that provide a scaffolding for prosociality (Apicella & Silk, 2019; Boyd, 2018; Davidov, Vaish, Knafo-Noam, & Hastings, 2016; Jensen, 2016; Nowak, 2012; Miller, 2018; Tomasello, 2009, 2016, 2019; Van Lange, Balliet, Parks, & Van Vugt, 2014; West, Griffin, & Gardner, 2007b, 2007b).

1.1.3. Zooming out: Cross-disciplinary approaches to prosociality

Given the central contribution of prosociality (and other related processes, such as fairness and morality) to sustaining human ultra-sociality it is unsurprising that the study of prosociality, in any of the various ways it can be deployed, from cooperation and collaboration to altruism to prosocial punishment, has become a meeting point for scholars doing basic or applied research in so many different fields within the social and natural sciences. These include, among others, psychobiology (Hepach, 2017; Miller, 2018; Nave, Camerer, & McCullough, 2015), social neuroscience (Buckholtz, 2015; Decety & Yoder, 2017; Everett, Faber, Crockett, & De Dreu, 2015; Stallen & Sanfey, 2015; Stenbeis, 2018), comparative and evolutionary psychology (;Baumard, André, & Sperber, 2013; Brosnan & De Waal, 2014; Melis & Warneken, 2016; Schmelz & Call,

2016; Tomasello, 2009, 2016; Tomasello & Vaish, 2013), developmental psychology (Aknin, van de Vondervoort & Hamlin, 2018; Eisenberg et al., 2015; Martin & Olson, 2015; McAuliffe, Blake, Stenbeis, & Warneken, 2017; Tomasello, 2019; van de Vondervoort & Hamlin, 2018; Warneken, 2018), personality psychology (Galang, 2010; Hilbig, Glöckner, & Zettler, 2014; Knafo-Noam et al., 2015; Ma, Tunney, & Ferguson, 2017), social psychology (Balliet & Van Lange, 2013; Crocker, Canevello, & Brown, 2017; Melamed, Simpson, & Harrell, 2017; Romano & Balliet, 2017; Simpson, Willer, & Harrell, 2017; van Dijk, Molenmaker, & de Kwaadsteniet, 2015; Van Lange et al.,, 2014), cognitive psychology (Batson, 2011; Bear & Rand, 2016; Decety, Bartal, Uzefovsky, & Knafo-Noam, 2016; Eisenberg et al., 2016; Grossmann, Brienza, & Bobocel, 2017; Jordan, Amir & Bloom, 2016; Imuta, Henry, Slaughter, Selcuk, & Ruffman, 2016; Ma, Tunney, & Ferguson, 2017; Nishi, et al., 2016; Rand, 2016; Rand et al., 2014; Warneken, 2016; Tomasello, 2014b, 2019), behavioural economics (Fehr & Schurtenberger, 2018; Herrmann, Thöni, & Gächter, 2008; Reigstad et al., 2017), ethology or behavioural biology (Burkart et al., 2014; De Waal, 2018; van Schaik & Burkart, 2018), evolutionary biology (Nowak, 2012; Rand & Nowak, 2013; West et al., 2007a, 2007b), and evolutionary anthropology (Awad, Dsouza, Schultz, Henrich, Shariff, Bonnefon, & Rawhan, 2018; Boyd & Richerson, 2009; Boyd, Gintis & Bowles, 2010; Henrich et al., 2005; Muthukrishna, Francois, Pourahmadi, & Henrich, 2017; Silk & House, 2011, 2016). In fact, many of the hot issues and hypotheses addressed in the study of prosociality are actually tackled cooperatively by teams of researchers working in many of these disciplines. So strongly cross-disciplinary and interdisciplinary (Hopkins, 2005) has become the field of study of prosociality that one finds it hard (and largely useless to try) to discern whether the work done can really be pigeonholed within any of the contributing disciplines.

1.1.4. Zooming in: Two studies on prosociality

In the present research we set out to study the psychology and social-ecology of prosociality. More specifically, we were interested in tackling two different, but complementary, sets of questions about prosociality. As we will see, although they required us to dive into different literatures, to approach the studies from different theoretical and conceptual frameworks, and to rely on different study designs and methods of data collection and analysis, nonetheless, the two studies comprising this work aimed to probe prosociality, some of its psychological underpinnings in young children and its contribution to peer relations and social status in groups of young adolescents. *Study 1*, already published (Aguilar-Pardo, Martínez-Arias, & Colmenares, 2013), sought to determine if inhibitory control, one key executive function (Diamond, 2013), was positively related to altruistic sharing, one of the forms of costly prosociality (see above), in 4 to 6 year-old young children. *Study 2* explored if group descriptive norms (Cialdini, Kalgren, & Reno, 1991) for prosocial behaviour in 13 year-old young adolescents moderated the negative impact of peer victimization on likeability, an index of peer status (Cillessen, 2011).

1.1.4.1 Altruistic sharing and executive functioning in young children

As highlighted above, altruistic behaviour in humans involves actions intended to provide an immediate benefit to another (the beneficiary) at an immediate cost to the actor (benefactor). This means that the benefactor shares material resources or information with the beneficiary or provides instrumental or emotional help to the beneficiary and in so doing the former incurs an immediate cost (for example, resources available to the benefactor are actually voluntarily given away to the beneficiary, the benefactor's time is wasted rather than used to maximize his or her own personal goals). Since *Study 1* is exclusively concerned with altruistic sharing, that is, the amount of a

valuable (and limited) resource which is kept for oneself versus shared with a potential recipient, in what follows we will mainly focus on studies that have measured and analysed this particular variety of costly prosocial behaviour.

Psychologists, biologists, anthropologists, and behavioural economists working on altruistic and cooperative behaviour more generally have relied on a variety of research protocols to deal with their specific theory-driven interests, including interview and questionnaire studies (on hypothetical situations) and experimental tasks (on actual situations). Whereas studies of helping, comforting, and informing, mostly conducted by developmental and comparative psychologists, have developed and applied customized experimental tasks (for example, helping: Warneken, 2016; comforting: Eisenberg et al., 2015; informing: Liszkowski, Carpenter, & Tomasello, 2008; for reviews see Eisenberg et al., 2015; Tomasello, 2009, 2019; Warneken, 2018), those working on the sharing of material resources have tended to use selected tasks from a large array of so-called economic games available (Brosnan, 2018; Fehr & Schurtenberger, 2018; Henrich et al., 2005; Henrich, Heine, & Norenzayan, 2010; McAuliffe et al., 2017). These are interaction settings ('games') in which one or several participants ('players') are asked to make decisions about the distribution of valuable (and limited) resources between themselves and others. Their decisions are linked to specific payoffs, meaning that what players eventually gain (their payoffs) when the game is over depends on the allocation decisions made by some or all players involved. Decisions are taken to be fair when resources are allocated equitably (or, in some protocols, according to merit, for example, Baumard, Mascaro, & Chevallier, 2012; Chevallier, Xu, Adach, vsn der Henst, & Baumard, 2015; Hamann, Bender, & Tomasello, 2014; Kanngiesser & Warneken, 2012; Liénard, Chevallier, Mascaro, & Baumard, 2013; or according to effort versus outcome, Noh, D'Esterre, & Killen,

2019); in fact, the participants' negative response to unequal resource allocations (i.e., inequity aversion) is seen as an indicator that a mature conception of fairness has been achieved (McAuliffe et al., 2017; Warneken, 2018). More recently, Engelman & Tomasello (2019a) have argued that children's sense of fairness is not so much about the distribution of material resources, but about its social meaning, that is, what partners consider they deserve (which might turn out to be unequal) after, for example, a collaborative activity. They replace the traditional 'fairness as inequity aversion' view for a 'sense of equal respect' notion (for contrasting views see McAuliffe, Warneken, & Blake, 2019; Engelman & Tomasello, 2019).

Economic games allow for the controlled assessment of the impact of multiple individual and contextual variables on the participants' level of prosocial sharing. In addition to the specific characteristics of each game, experimental conditions that are potentially manipulated in the games include the type of currency (goods, services, information, or other valuable resources) and the origin of the resource to be split (windfall versus joint effortful collaboration between players), whether the decision is private versus public with regards to the other players (relevant for assessing positive or negative reciprocation), or even potential bystanders (relevant for assessing reputation), whether the game is played repeatedly or just once (relevant for assessing reciprocation), the time allowed to make the decision (immediately versus after a pre-established time delay; relevant for assessing automaticity [effortless] versus reflectiveness [effortful] in decision making), and previous experience with economic games, among others. There are many economic games available in the field, each suitable to address and test different theory-driven questions and hypotheses. These include, among others, the Prosocial Choice Test, the Envy Game, the Sharing Game, the Prisoner's Dilemma Game, the Ultimatum Game, the Dictator Game, the Third-

party Punishment Game, the Public Goods Game, the Inequity Game, the Chicken or Snowdrift Game, and the Trust Game (Apicella & Silk, 2019; Fehr, Bernhard, & Rockenbach, 2008; Fehr & Schurtenberger, 2018; Henrich et al., 2005; McAuliffe et al., 2017; Rand et al., 2014; Silk & House, 2011; Van Lange et al., 2014; see also Colmenares, 2015).

Since *Study 1* (Aguilar-Pardo et al., 2013) is concerned specifically with altruistic sharing in a Dictator Game and its relation to inhibitory control, we will first provide an operational definition of the Dictator Game (DG) and then some background information on executive functions in general and inhibitory control (and related constructs) in particular. Next we will provide a short overview of findings obtained in published studies on altruistic sharing and inhibitory control (or related constructs) unavailable when our study came out, although there are not many.

In the DG, a player (the proposer, allocator or dictator) is given a windfall endowment of a certain resource and is told to decide and propose how much of it, that is, some, all or nothing, he or she is willing to sacrifice by giving it away to (or sharing it with) a second player. The latter fulfils an entirely passive role in the game, i.e., he or she can neither accept nor reject the offer. The endowment is then split as decided by the dictator. The DG is typically played once, with an anonymous stranger. When played in this standard version, the DG is regarded as the game that best portrays a player's motivation for genuine altruism. Interestingly enough, when behavioural economists experimentally tested the so-called *Homo economicus* canonical model of behavioural decisions in contexts where individuals can behave altruistically or selfishly, they came up with some initially puzzling results. In effect, this model of self-interested behaviour as a foundation for human behaviour, also called the *selfishness axiom* (Henrich et al., 2005), predicts that individuals should behave rationally and seek

to maximize their own material gains (that is, motivated purely by self-interest, dictators should be rational maximizers and make zero offers). However, contrary to expectations, hundreds of cross-cultural economic experiments from around the world have reported the existence of large, consistent deviations from the canonical model's predictions (Henrich et al., 2005). Nevertheless, although the existence of these deviations from the selfish axiom of zero offers (in the DG) is universal, the researchers have also found that, after controlling for ecological and demographic variation, a substantially large amount of variation across cultures still remains. This variation, which is also true of other forms of altruistic prosocial behaviour, for example, third-party punishment, has been interpreted as being directly linked to the impact of culture-related variation in social norms, institutions, values, and other cultural markers (Henrich et al., 2005, 2006, 2010). Thus, by and large, the findings indicate that, although individual variation within and across cultures is substantial, nonetheless, people from around the world do care about fairness and reciprocity and are willing to sacrifice their own gains if doing so makes the distribution of material resources between participants more egalitarian. In fact, people are prone to incur heavy ('irrational') personal costs to reward prosocial actors and to punish free-riders (Balliet, Mulder, & Van Lange, 2011; Baumard, 2010; Baumard, André, & Sperber, 2013; Boyd, Gintis, Bowles, & Richerson, 2010; Fehr & Gächter, 2002; Fehr & Schurtenberger, 2018; Henrich et al., 2005, 2006; Jensen, & Tomasello, 2010; Marlowe et al., 2008).

Much human behaviour is deployed in social contexts in which the interacting partners face conflicts of interest (clashes between the conflicting optima of each partner) and, therefore, have to deal with partly (or even largely) incompatible individual goals. Furthermore, in many of such social situations insisting on maximizing one's personal goals can (and often does) actually prove less profitable than switching

to furthering jointly agreed collective goals. Thus, as the social interaction goes on, participating partners are forced to continuously monitor and update information, both current and past, to reset and realign their emotions, goals and plans, and to flexibly adjust and organize their actions so that the new plans (orderly sequence of actions) can be executed and the changed goals can be reached successfully. The set of high-level cognitive processes that provide a scaffold for this cognitively demanding social manoeuvring are called executive functions (Diamond, 2013; Gilbert & Burgess, 2008; Hofmann, Schmeichel, & Baddeley, 2012), which are taken to engage several regions of the prefrontal cortex (Blair, Zelazo, & Greenberg, 2005; Diamond, 2013; Gilbert & Burgess, 2008; Knoch & Nash, 2015; Rilling & Sanley, 2011).

Executive functions comprise three foundational components, namely, working memory, cognitive flexibility, and inhibitory control (Diamond, 2013; Hofmann et al., 2012). *Working memory* entails holding in mind information no longer perceptually present and mentally working with it. *Cognitive* (or mental) *flexibility* refers to the ability to switch between perspectives and alternatives and to adjust readily to changed priorities or improbable and unanticipated outcomes. And *inhibitory control* has to do with the capacity to suppress, maintain, or modify one's attention, emotions, thoughts, and actions driven by strong internal (innate or learned) predispositions or by powerful external stimuli. There are diverse forms of inhibitory control and a vast array of measures to assess it (e.g., Diamond, 2013). For example, some authors distinguish between *interference control* of attention or of mental representations, and *self-control* of emotions or actions. Resisting temptations, not acting impulsively, and delaying gratification are all good examples of self-control processes that have often been assessed experimentally (Diamond, 2013). Importantly, individuals are said to make behavioural decisions and express preferences provided that (a) there are several

response choices available about, for example, what and for how long to attend to, what emotions to experience, what thoughts to hold, and how to act, and (b) they are able to pick those they believe to be more appropriate or needed in the current situation according to, for example, their updated goals.

Inhibitory control is closely related to other constructs commonly used in the field, such as self-regulation or self-control and effortful control (Diamond, 2013; Hofmann et al., 2012), although there are many others (see Beran, 2015; Duckworth & Kern, 2011, Duckworth & Steinberg, 2015). *Self-regulation* or *self-control* (often used interchangeably, although they can also be operationally distinguished) refer to the individual's capacity to override unwanted emotional or behavioural responses and to favour instead alternative courses of action better aligned with changed goals (Alquist & Baumeister, 2012; Baumeister, Vohs, & Tice, 2007; Duckworth & Steinberg, 2015). *Effortful control* is a temperament dimension and refers to the individual's capacity to control and regulate emotional and behavioural reactivity to pain or to distressing, novel, uncertain, or frustrating environmental conditions (Rothbart, 2007; Rueda, 2012; see also Eisenberg, Smith, & Spinrad, 2004). Interestingly, a defining characteristic of these psychological processes is that they consume cognitive resources that can, therefore, be temporally depleted (Alquist & Baumeister, 2012; Inzlicht, Schmeichel, & Macrae, 2013). In other words, exerting inhibitory (or self-) control is effortful (Duckworth & Kern, 2011) even if some of it can add an extra rewarding value to the goals reached (Inzlicht, Shenhav, & Olivola, 2018).

Are altruistic sharing (or helping) actions related to inhibitory control? Is there anything that has to be suppressed for altruistic (or selfish) behaviour to surface? Does altruistic (or selfish) responding come as the expression of an impulse or an enacted natural tendency? Is there a default (automatic and effortless) mode of responding,

prosocially or selfishly, when people face the social dilemmas they encounter recurrently every single day? These are questions that remain largely unsettled, with researchers aligned with different stances and studies generating mixed empirical findings open to alternative interpretations. Here there are two separated, although arguably interrelated, issues involved. One is whether there is a natural tendency towards prosociality (and perhaps fairness) versus selfishness, that is, a sort of experience-independent default mode of response not shaped by the local culture's social and moral norms (Brownell, 2013, 2016; House, Henrich, Brosnan, & Silk, 2012; Rochat et al., 2009; Smith, Blake, & Harris, 2013; Schmidt & Sommerville, 2011; reviews in McAuliffe, Blake, Steinbeis, & Warneken, 2017; House, 2018; Tomasello, 2009; Warneken, 2018). The other is whether the decision to behave prosocially or selfishly is made intuitively or deliberatively. In the former, the individual's response is said to be automatic, fast, unintentional, emotional-irrational (hot), inflexible and effortless, whereas in the latter, the response is expected to be controlled, slow, intentional, unemotional-rational (cool), flexible, and effortful (Evans, 2008). This dual-process framework has been criticized for potentially misrepresenting (and oversimplifying) the complexity of the processes underlying behavioural decisions (Evans & Stanovich, 2013 and Pennycook et al., 2018 versus Keren & Schul, 2009; Melnikoff & Bargh, 2018). Similarly, the notion that decision times can be reliably interpreted as a direct proxy for the adequate assessment of intuitive versus deliberative processes has been questioned by some researchers (Evans, Dillon, & Rand, 2015; Kieslich & Hilbig, 2014; Krajbich et al., 2015).

In support of the view that prosocial responding comes naturally is work showing that from a very young age children discriminate and prefer prosocial over selfish characters (Hamlin, Wynn, & Bloom, 2007; Olson & Spelke, 2008; for reviews see

Hamlin & Van de Vondervoort, 2018; Van de Vonderwoort & Hamlin, 2018), are intrinsically motivated to help or see others helped and to do so anonymously (Hepach, Vaish, & Tomasello, 2012; Hepach, Vaish, Grossmann, & Tomasello, 2016; Hepach, Haberl, Lambert, & Tomasello, 2017; for reviews see Hay, 1994; Eisenberg et al., 2015; Hepach, 2017; Hepach, Vaish, & Tomasello, 2013; Tomasello, 2009; Warneken, 2018), choose prosocial options indiscriminately even when their partners behave selfishly (Sebastián-Enesco, Hernández-Lloreda, & Colmenares, 2013), and provide others with information they need with no external reward (Liszkowski, Carpenter, Striano, & Tomasello, 2007; Liszkowski, Carpenter, & Tomasello, 2008). In fact, external incentives have been shown to undermine intrinsically motivated acts of altruistic helping and sharing (cf. 'overjustification effect'; see Ulber, Hamann, & Tomasello, 2016; Warneken & Tomasello, 2008). Also, some studies have shown that even by 3 years of age children are already aware that prosocial behaviour is regulated by social norms that everyone is expected to conform to, and they already actively enforce them when others transgress them (Rakoczy, Warneken, & Tomasello, 2008; Rakoczy, Kaufmann, & Lohse, 2016; Vaish, Missana, & Tomasello, 2011; for reviews see Rakoczy & Schmidt, 2013; Schmidt & Rakoczy, 2019; Tomasello, 2009, 2014a; Tomasello, 2019; Warneken, 2018).

In support of the alternative view that young children are initially selfish and that prosocial responding is primed and shaped by exposure to a socializing context heavily filled with social and moral norms is work showing that young children's prosocial choices is strongly age-dependent, initially rather weak and then increasing steadily with age until they turn 7-8 years of age (Benenson, Pasacoe, & Radmore, 2007; Brownell, Svetlova, & Nichols, 2009; Sloane, Baillargeon, & Premack, 2012; Blake & McAuliffe, 2011; Fehr, Bernhard, & Rockenbach, 2008; Lucas, Wagner, & Chow,

2008; Rochat, Dias, Liping, Broesch, Passos-Ferreira, Winning, & Berg, 2009; for reviews see Brownell, 2013, 2016; Eisenberg et al., 2015; McKauliffe et al., 2017; Warneken, 2018). Nevertheless, it must be made clear that being prosocial is not necessarily the same as being egalitarian (inequity averse); in this respect, a fully-fledged sense of fairness, when children reject both disadvantageous as well as advantageous inequity allocations, does take time to develop and, as mentioned, is not actually achieved until children reach 7-8 years of age (McAuliffe et al., 2017; Warneken, 2018), although cross-cultural variation has also been reported (Blake et al., 2015; House et al., 2013; House, 2016; Rochat et al., 2009). This age seems to be a watershed in the development of morality (Tomasello, 2016, 2018, 2019). Nevertheless, as expected, the probability and extent of children's prosocial responding and sensitivity to fairness is not simply age-dependent and fixed, but it is also sensitive to a large number of dispositional, experiential and situational variables that are susceptible to being systematically controlled in experimental settings (e.g., House, Henrich, Brosnan, & Silk, 2012; House, Henrich, Samecka, & Silk, 2013; for reviews see McAuliffe et al., 2017; Warneken, 2018).

The other source of data that has been used to assess what is the default response to social dilemmas, that is, pursuing one's self-interest versus favouring the partner's welfare, is information on decision times. What reaction is more likely to occur faster, prosocial behaviour or self-interested behaviour? Which response is more intuitive and which more deliberative? We have already noted that the dual (dichotomous) classification of the cognitive processes that underpin social decision-making when confronting social dilemmas has been contested (see above). Also, the empirical evidence about the relation between response speed and the probability that the individual will choose cooperation is mixed (for positive evidence see: Bear & Rand,

2016 in one-shot (but not in repeated) PDGs; Cappelen et al., 2016 in DGs; Cone & Rand, 2014 in PGGs; De Dreu et al., 2015 in PDGs; Lotito, Migheli, & Ortona, 2013 in 10-shot PGGs; Lotz, 2015, in PGGs; Rand, Greene, & Nowak, 2012, Rand et al., 2014, in one-shot PGGs; for negative or null evidence see: Capraro & Cococcioni, 2016 in one-shot PDGs; Capraro & Cococcioni, 2015 in one-shot PDGs; Verkoeijen & Bouwmeester, 2014 in PPGs; see also Achtziger et al., 2015 in UGs and DGs; Andersen, Gneezy, Kajackaite, & Marx, 2018 in DGs; Grossman, Brienza, & Bobocel, 2017 in PGGs; Rand & Kraft-Todd, 2014 in one-shot PGGs). There is growing evidence that contemporary theoretical models need to incorporate dispositional, experiential, and situational variables if they are to account for the variation that should be expected and that is actually reported in the decisions that individuals make to solve social dilemmas (Capraro, 2013; Capraro, Smyth, Mylona, & Niblo, 2014; Capraro, Jordan, & Rand, 2014; Cheung, 2014; De Dreu et al., 2015; Hilbig, Zettler, & Heydasch, 2012; Hilbig, Glöckner, & Zettler, 2014; Kieslich & Hilbig, 2014; Zettler, Hilbig, & Heydasch, 2013).

A key issue in the context of the current research is whether prosocial versus self-interested responding is related to inhibitory control as a stable trait, or to depletion of self-control resources as a transient state. The studies that have examined the relation between some form of prosocial behaviour (for example, collaboration or altruistic sharing) and inhibitory control indicate that there is a positive link between the two variables, however, the trend does not always emerge clearly (Ciairano, Visu-Petra, & Settanni, 2007; Colmenares, Sebastián-Enesco, Martín-Babarro, & Sanchez-Iglesias, 2019; Gailliot, Gitter, Baker, & Baumeister, 2012; Giannotta, Burk, & Ciairano, 2011; Hao, 2017; Kanacri et al., 2013; Kocher, Martinsson, Myrseth, & Woolbrant, 2017; Liu et al., 2016; Martinsson, Myrseth, & Wollbrant, 2012; Martinsson, Myrseth, &

Wollbrant, 2014; Myrseth, Riener, & Wollbrant, 2015; Smith, Blake, & Harris, 2013; see also Blake, 2018; Blake, Piovesan, Montinari, Warneken, & Gino, 2015; Colasante, Zuffiano, Bae, & Malti, 2014; Martin-Babarro et al., 2013).

As for the relation between prosociality and cognitive depletion, the results show that self-control depleted individuals tend to be less prosocial, less concerned with the well-being of others, less helpful, less compliant with social norms, and more likely to behave dishonestly and cheat (Achtziger, Alós-Ferrer, & Wagner, 2015; Balliet & Joireman, 2010; DeWall, Baumeister, Gailliot, & Maner, 2008; DeBono, Shmueli, & Muraven, 2011; Gailliot, Gitter, Baker, & Baumeister, 2012; Gino, Schweitzer, Mead, & Ariely, 2011; Halali, Bereby-Meyer, & Ockenfels, 2013; Osgood & Muraven, 2015; Xu, Bègue, & Bushman, 2012). Nevertheless, there are also studies reporting opposite results, namely, a positive relation between cognitive load and prosociality (Dreber, Fudenberg, Levine, & Rand, 2014; Schultz, Fischbacher, Thöni, & Utikal, 2011), or no relation at all (Hauge, Brekke, Johansson, Johansson-Stenman, & Svedsäter, 2009). Interestingly and somehow counterintuitively, in the Halali et al.'s (2013) study the researchers found that a shortage of cognitive control was associated with an increase (not a decrease) in fair behaviour (i.e., equal split offers) by proposers in the Ultimatum Game. Right the opposite trend to the one found when cognitively loaded participants played the DG.

1.1.4.2 Adolescents' prosociality in socio-ecological context

For school-age children and adolescents, the school and the classroom are the critical social-ecological niches where they are bound to socialize with peers, develop and sharp their social-cognitive skills, manage their emotions, and forge and service their network of peer relationships (Brown, 2011; Rubin, Bukowski, & Laursen, 2011). And it is clear that not everyone proves equally successful in this scenario, individual differences are

huge indeed; for example, those who suffer from social exclusion, are victimized, or are generally involved in poor relationships tend to fare badly in several domains, i.e., psycho-social adjustment and academic success (Copeland, Wolke, Angold & Costello, 2013; Gini & Pozzoli, 2009; Vaillancourt, Hymel, & McDougall, 2013; Troop-Gordon, 2017). The effects of adverse peer relationships can be so devastating that research on the causes, processes and outcomes of differences in peer relationships is not only warranted but much needed. The information obtained in these studies can help to implement programmes aimed at preventing antisocial behaviour and at mitigating their effects whenever it eventually arises (Shachtman & Ifargan, 2009; Bosworth & Judkins, 2014; Yoon & Bauman, 2014; Salmivalli, 2014; Farrington & Ttofi, 2009; Smith, Cousins, & Stewart, 2005; Swearer, Espelage, Vaillancourt, & Hymel, 2010). To research the nature of adolescents' peer relations and the determinants and consequences of its variation several dimensions have to be addressed: the *social status* of adolescents, the *behavioural contents* of their social relationships, the *behavioural correlates* of *peer status*, and the possible *moderators* of *behaviour-status links*, these can include *group norms* and group's *network parameters*, among others. We will be particularly concerned with the role of prosocial behaviour in the adolescents' peer relations and social status within groups that vary in behaviour-social status associations. In what follows we will provide a short overview of key concepts on each of the aforementioned dimensions. These will be fully addressed in chapter 3.

Peer *social status* refers to the position ('ranking') that like-aged individuals achieve within a group with regards to a variety of attributes or qualities (e.g., competence, group conformity; group commitment, generosity; Anderson & Kilduff, 2009). Status striving has been shown to become a critical matter to adolescents, particularly the component of peer-perceived popularity (e.g., Coplan & Bowker, 2014;

Engelmann & Rapp, 2018; LaFontana & Cillessen, 2010; Mayeux & Cillessen, 2008; Murray-Close, 2013; van den Broek et al., 2016; Cillessen, 2011; Shin, 2017), one that greatly influences their behaviour and their social relations within the peer group, that is associated with their developing socio-cognitive and emotional competence and that potentially impacts their wellbeing and an array of health and academic outcomes (Espelage et al., 2013; Mehari & Farrell, 2015; Nakamoto & Schwartz, 2010; Schwartz et al., 2005, 2013; Wang et al., 2014). The *social status* of peers in a group (e.g., a classroom) is typically evaluated through at least five different (but to a varying extent related) constructs, which can be measured by a variety of methods, including direct observation, and self-, peer- or teacher-reported nominations and ratings. These are social dominance, power, popularity, visibility, and likeability.

S*ocial dominance* or dominance status can be defined as the ability to monopolise resources (including social partners and the services they can provide) that are valued and desirable (because they enhance one's individual goals) and that are typically in limited supply and, therefore, accessible only via competitive strategies, cooperative strategies, or both (Closson, 2009; Closson & Hymel, 2016; Jonkman, Trautwein, & Lüdtke, 2009; Lease, Kennedy, & Axelrod, 2002; Lease, Musgrove & Axelrod, 2002; Mayeux, 2014). *Power,* defined as an individual's capacity to act as a leader that others attend to and to be influential on his or her peers (Vaillancourt & Hymel, 2006). *Popularity,* also called perceived popularity, reputation-based popularity, and consensual popularity, operationalized as the difference between the number of most popular and least popular nominations (reviews in Cillessen & Rose, 2005; Cillessen, Schwartz, & Mayeux, 2011). *Visibility*, also referred to as social impact, prestige, reputation, or prominence, is derived from adding liked most and liked least nominations (Coie, Dodge, & Coppotelli, 1982; Farmer, Hamm, Leung, Lambert, &

Gravbelle, 2011; Garandeau, Lee, & Salmivalli, 2014; Knack, Tsar, Vaillancourt, Hymel, & McDougall, 2012; Zwaan, Dijkstra, & Veenstra, 2013). And, finally, *likeability,* also called sociometric popularity, social preference, acceptance and peer liking, assessed as the difference between the number of liked most (acceptance) and liked least (rejection) nominations (reviews in Coie & Cillessen, 1993; Cillessen, Schwartz, & Mayeux, 2011).

Conceptually, the constructs social dominance, social power, peer-perceived or reputation-based popularity and visibility or social impact have been claimed to reflect a common underlying dimension, that is, an individual's ability to attract others' attention, to be influential and respected (or even feared) in the group, and to have priority of access to resources whenever they happen to be contested (Cillessen, 2011; Cillessen & Marks, 2011; Clifford, 1963; Jonkmann, Trautwein, & Lüdtke, 2009; Li & Wright, 2014; Mayeux, 2014; Parkhurst & Hopmeyer, 1998; Pellegrini, Roseth, Ryzin, & Solberg, 2011; Peters, Cillessen, Riksen-Walraven, & Haselager, 2010; Ruschoff, Dijkstra, Veenstra, & Lindenberg, 2015; Sandstrom, 2011; Shin, 2017; Zwaan, Dijkstra, & Veenstra, 2013). Of these four constructs, the one that has received by far the greatest attention has been popularity, alongside the fifth construct, likeability. Whereas popularity is related to impact, visibility, reputation, prestige and the like, likeability is more related to affection and peer acceptance or rejection (Cillessen, 2011; Cillessen & Marks, 2011; Ruschoff, Dijkstra, Veenstra, & Lindenberg, 2015). The correlation between these two constructs of peer status, i.e., popularity and likeability, is highly variable (see Chapter 3, Appendix 3.1).

Developmental psychologists interested by the study of adolescents' peer relations have traditionally focused mainly on two major behavioural categories, namely, *aggression* and *prosocial* behaviour (Eisenberg, Spinrad, & Knafo.Noam, 2015;

Eisenberg, VanSchyndel, & Spinrad, 2016; Lansford, 2018; Malti & Rubin, 2018a), and have tended to largely neglect two other behavioural constructs, i.e., *affiliative* (or friendly) *behaviour* and *reconciliation* (as a form of interpersonal conflict resolution) that are also pivotal building blocks of adolescents' social relationships and friendships (Butovskaya, 2008; Laursen, Finkelstein, & Betts, 2001; Roseth, Pellegrini, Dupuis, Bohn, Hickey, Hilk, & Peshkam, 2011). Indeed, the study of aggression and prosocial behaviour is a meeting point of researchers trained in different disciplines. They share a common interest for elucidating the causes and consequences of aggression and prosocial behaviour in adolescents' social relationships; however, they approach its study from different (but potentially complementary) theoretical perspectives. These can be grouped into two major categories. Those focusing only on proximate (mechanistic) causes and consequences, for example, the study of the physiological, psychological, and social drivers, correlates, and effects of aggressive and prosocial behaviours (e.g., physiological, developmental and social psychologists: Branje & Koot, 2018; Miller, 2018; Lansu, Cillessen, & Bukowski, 2013; Malti & Rubin, 2018a; Murray-Close, 2013; Pattiselanno, Dijkstra, Steglich, Vollebergh, & Veenstra, 2015; Shin, 2017; van Hoorn, Dijk, Meuwese, Rieffe, & Crone, 2016), and those seeking to integrate proximate and ultimate (evolutionary) causes and fitness consequences, for example, the study of the four whys of aggression and prosocial behaviour (e.g., comparative and evolutionary psychologists, and ethologists: Archer & Browne, 1988, 2009; Hawley, 1999, 2003; Jensen, 2016; Paulus, 2018; Tomasello & Vaish, 2013; Verbeek & Palagi, 2016; Warneken & Tomasello, 2015).

Although there is no general consensus as to the nature and function of aggression, particularly between evolutionarily-minded approaches versus non-comparative perspectives focused on proximate mechanisms, and, therefore, about its

conceptualization and typology, many would probably agree that aggression can be broadly defined as any action intended to harm or decrease the target's welfare and fitness (e.g., Eisner & Malti, 2015; Malti & Rubin, 2018b). Developmental researchers working on adolescents' peer relations and aggression have distinguished two dimensions that allow the identification and study of several aggression subtypes, the *form* of its expression or how it is enacted, namely, overt or covert, and the *function* it fulfills or what it is for, namely, proactive and reactive (Branje & Koot, 2018; Card, Stucky, Sawalani, & Little, 2008; Casper, Card, Nauman, & Toomey, 2017; Crapanzano, Frick, & Terranova, 2010; Frey & Strong, 2017; Malti & Rubin, 2018b; Ostrov, Perry, & Blakely-McClure, 2018; Polman, de Castro, Thomaes, & van Aken, 2009; Sijtsema & Ojanen, 2018). Elbert, Schauer, & Moran (2018) have proposed a third function-based category of aggression called *appetitive aggression*, more related to proactive than reactive aggression, but, unlike the former, it is intrinsically (not extrinsically) motivated.

Overt or direct aggression can be physical (e.g., hitting, kicking, and pushing) and verbal (e.g., insulting, yelling, and calling nasty names). Direct aggression also includes actions aimed at damaging or destroying the target's things or properties. In contrast, c*overt or indirect aggression*, also called relational and social aggression (e.g., threatening to end a friendship, spreading negative rumours), is aimed to intentionally socially excluding and harming the target's social relationships and reputation (Archer & Coyne, 2005; Boxer, Tisak, & Goldstein, 2004; Card, Sawalani, Stucky, & Little, 2008; Casper & Card, 2016; Casper, Card, Bauman, & Toomey, 2017; Dailey, Frey, & Walker, 2015; Donoghue & Raia-Hawrylak, 2016; Heilbron & Prinstein, 2008; Kistner, Counts-Allan, Dunkel, Drew, David-Ferdon, & Lopez, 2010; Lansford, 2018; Williford, Brisson, Bender, Jenson, & Forrest-Bank, 2011).

Reactive aggression, also called defensive or "hot-blooded" aggression, is a response to a perceived (or actual) offense or a frustrating event and typically involves high emotional arousal. In contrast, *proactive aggression*, also called instrumental or "cold-blooded" aggression, involves purposeful and planned actions directed toward attaining some desirable goal and typically lacks emotional arousal (Boxer, Tisak, & Goldstein, 2004; Card & Little, 2006; Malti & Rubin, 2018b; Dodge, Coie, Pettit, & Price, 1990; Renouf, Brendgen, Séguin, Vitaro, Boivin, Dionne, Tremblay, & Pérusse, 2010; Polman, de Castro, Koops, van Boxtel, & Merk, 2007; Skripkauskaite, Hawk, Branje, Koot, van Lier, & Meeus, 2015; Smeets, Oostermeijer, Lappenschaar, Cohn, van der Meer, Popma, Jansen, Rommelse, Scheepers, & Buitelaar, 2017; Wrangham, 2017).

One distinctive form of proactive aggression that emerges especially when young adolescents enter middle-school is *bullying* and *victimization*, defined as proactive (unprovoked) physical, verbal, or relational aggressive behaviour that the perpetrator (the bully or offender) uses repeatedly and abusively against a defenseless target (the victim), due to power imbalance, and that is aimed to intentionally cause physical and psychological harm (Coie, Dodge, Terry, & Wright, 1991; David-Ferndon & Simon, 2014; Doll, Song, & Siemers, 2004; Donoghue & Raia-Hawrylak, 2016; Hymel & Swearer, 2015; Juvonen & Graham, 2014; Lansford, 2018; Marini & Volk, 2016; Menesini & Salmivalli, 2017). According to Volk, Dano, & Marini (2014), it is this power imbalance between the perpetrator and the victim what makes bullying the unique form of proactive aggression it is. Given its high prevalence and potentially severe (and lasting) consequences, especially on the welfare and health of victims, both the traditional as well as the electronic forms of bullying and victimization have become a serious health issue and economic burden (Brendgen & Poulin, 2017; David-Ferndon

& Simon, 2014; Gini & Pozoli, 2013; Juvonen & Graham, 2014; McDougall & Vaillancourt, 2015; Menesini & Salmivalli, 2017; Vaillancourt, Hymel, & McDougall, 2013).

Many aggression researchers have claimed that the construct aggression is heterogeneous and multidimensional as the different subtypes identified and analysed have been found to correlate with one another only moderately (see, however, Casper & Card's, 2016, meta-analysis where they reported a rather high correlation between overt vs relational aggression, r= .72) and to differ in its neural and psychological underpinnings, in its developmental trajectories and in the outcomes they are associated with (Branje & Koot, 2018; Brugman, Lobbestael, Arntz, Cima, Schuhmann, Dambacher, & Sack, 2015; Eisner & Malti, 2015; Lansford, 2018; Little, Jones, Henrich, & Hawley, 2003; Ostrov et al., 2018; Polman, de Castro, Koops, van Boxtel, & Merck, 2007; Polman, de Castro, Thomaes, & van Aken, 2009; Wrangham, 2017).

Peer victimization is often used interchangeably for bullying or harassment (e.g., Graham, 2006) or for being the target of bullying (Haltigan & Vaillancourt, 2018); however, it can also refer more generally to the experience of being the target of others' aggressive behaviour, be it proactive or reactive (Card & Hodges, 2008; Hawker & Boulton, 2000). It is reported to be associated with internalizing (depression, anxiety, and suicidal ideation) and externalizing (aggressive, disruptive, attention problems, antisocial behaviour) problems, loneliness, and poor academic achievement (reviews: Casper & Card, 2016; McDougall & Vaillancourt, 2015; Troop-Gordon, 2017).

Prosocial behaviour can be broadly defined as any action intended to benefit or increase the target's welfare and fitness (Choi, Johnson, & Johnson, 2011; Eisenberg, Spinrad, & Knafo-Noam, 2015; Lindenberg, 2006). Like aggression, prosocial

behaviour can also be proactively or instrumentally used to pursue the attainment of self-interested goals (Boxer, Tisak, & Goldstein, 2004). Prosociality is considered to foster positive feelings and enhance cooperation at a dyadic level and cohesion at a group level (Aikins & Litwack, 2011; Aknin, Van de Vondervoot, & Hamlin, 2018). As a matter of fact, much of the evolutionary success of humans as a species is claimed to be related to their ultra-sociality, and this ultimately relies heavily upon its evolved unique forms of cooperation and its social-cognitive scaffolding (Tomasello, 2014a, 2014b, 2019).

Giving and receiving instrumental, material, and emotional help is among the major services and benefits that tend to be reciprocally exchanged, balanced and stable over time within friendships (Dunbar, 2018; Fujisawa, Kutsukake, & Hasegawa, 2008; Hruschka, 2010; Laursen & Hartup, 2002; Mayeux, Houser, & Dyches, 2011; Padilla-Walker, Fraser, Black, & Bean, 2015; Shin, 2017). Overall, adolescents' prosocial behaviour has been shown to be positively associated with various outcomes, including social competence, academic achievement, well-being and health (Aknin, Van de Vondervoot, & Hamlin, 2018; Caprara, Kanacri, Zuffiano, Gerbino, & Pastorelli, 2015; Dunbar, 2018; Griese & Buhs, 2014; Huang, Liu, & Liu, 2016; Schacter & Juvonen, 2018; Traylor, Williams, Kenney, & Hopson, 2016), and with being well-liked by their peers.

In sum, aggression and prosocial behaviour represent two central components of the behavioural repertoire that adolescents enact to form, sustain and terminate their social relationships with peers. And, both behavioural categories have been found to correlate with each other, although the strength and valence of the correlation is highly variable with more reports of negative correlations than positive correlations (see Chapter 3, Appendix 3.2). Also, aggression tends to correlate positively with

victimization, whereas prosocial behaviour correlates negatively with victimization (see chapter 3, Appendix 3.3).

What are the behavioural correlates of the adolescents' peer status in their groups? One of the patterns most commonly reported is that *popularity* correlates positively with *aggression* and negatively with peer *victimization* (see Chapter 3, Appendix, 3.4). On the other hand, *likeability* has been found to be negatively associated with *aggression* (see Chapter 3, Appendix 3.5) and with *victimization* (see Chapter 3, Appendix 3.7) and positively with *prosocial behaviour* (see Chapter 3, Appendix 3.6). A link we will focus on in the current research is the negative impact of victimization (level of aggression received) on the adolescents' likeability status (see chapter 3).

In studies of peer relationships and status based on sociometric methods (reviews in Coie, Dodge, & Coppotelli, 1982; Cillessen & Marks, 2011; van den Berg, Burk, & Cillessen, 2014), the scores obtained by the students generally reflect the perception that their peers have of their *behaviour* and their *status* (for example, their *likeability* and *popularity)*. These perceptions not only reflect the influence of *individual characteristics* of both the participants and their peers, but also of *group characteristics* (Knack, Tsar, Vaillancourt, Hymel, & McDougall, 2012; Kohm, 2015; Cross & Barnes, 2014; Wolters, Knoors, Cillessen, & Verhoeven, 2014; Andrews, Hanish, Fabes, & Martin, 2014; Isaacs, Voeten, & Salmivalli, 2013). Although the importance of peer ecology and the group's normative characteristics were acknowledged and incorporated to influential theoretical models by early developmental researchers, for example, when they emphasized the interdependency between the individuals' behaviour and their contexts over the course of their entire lifespans (Bronfenbrenner, 1979; Espelage, 2014; Heft, 2013; Lerner, Agans, SeSouza, & Gasca, 2013), however, it has been only relatively recently that large-scale empirical testing of specific hypotheses and

predictions following from these theoretical models has been undertaken. And this field is currently blossoming as the burst of papers coming out is attesting to (reviews in Espelage, 2014, 2015; Hong & Espelage, 2012; Pozzoli, Gini, & Vieno, 2012; Salmivalli, 2010; Steffgen, Recchia, & Viechtbauer, 2013; Salmivalli, 2014; Swearer, Wang, Berry, & Myers, 2014).

Especially relevant in the present context are studies that have specifically tackled issues bearing on the potentially moderating effects of *behavioural group norms* on the relation between individual behaviour and the peers' social status in different groups, more specifically on the negative association between peer victimization and likeability. Behavioural group norms can be descriptive (or popular) or injunctive (or prescriptive) (Cialdini, Kalgren, & Reno, 1991). *Descriptive norms* refer to what peers typically do, i.e., the average or central tendency of a behaviour in a given group, whereas *injunctive norms* refer to what peers typically believe they ought to do, i.e., the average or the central tendency of the belief about the appropriateness (approval or disapproval) of a behaviour in a given group. Deviations from descriptive or injunctive behavioral norms in a group make the deviant individuals' behaviour or beliefs, respectively, non-normative and more likely to be singled out and subjected to ostracism or targeted by proactive forms of aggression, including overt or covert aggression. A number of studies of elementary (Wright, Giammarino, & Parad, 1986; Boivin, Dodge, & Coie, 1995; Stormshak, Bierman, Bruschi, Dodge, & Coie, 1999) and secondary (Boor-Klip, Segers, Hendrickx, & Cillessen, 2015; Chang, 2004; Kärnä, Voeten, Poskiparta, & Salmivalli, 2010; Isaacs, Voeten, & Salmivalli, 2013; Salmivalli & Voeten, 2004) students have found that the association between behaviour (for example, aggression and victimization) and peer status (for example, popularity and likeability), can be moderated (weakened or strengthened) by the classroom norms for aggression

(including bullying) or victimization. Other approaches to the study of the effect of group norms on behaviour-peer status links can focus on groupings other than the entire classroom. For example, Dijkstra, Lindenberg, & Veenstra (2008) assessed the effect of the norms for bullying of entire classrooms and of the subgroups of most popular and non-popular on the negative association between bullying and acceptance and the positive association between bullying and rejection.

Another type of classroom-level characteristics whose impact on behaviour-peer status links has been assessed are indices derived from network analysis (Wasserman & Faust, 1994), such as *embeddedness* (Ahn, Garandeau, & Rodkin, 2010), *centralization* (Ahn & Rodkin, 2014; Meter & Card, 2016; Serdiouk, Rodkin, Madill, Logis, & Gest, 2015), *hierarchical structure* (Garandeau, Ahn, & Rodkin, 2011; Garandeau, Lee, & Salmivalli, 2014; Martín-Babarro, Díaz-Aguado, Martínez-Arias, & Steglich, 2016; Pattiselanno, Dijkstra, Steglich, Vollebergh, & Veenstra, 2015; Saarento, Garandeau, & Salmivalli, 2014; Saarento & Salnivalli, 2015), *cohesion* (Martín-Babarro, Díaz-Aguado, Martínez-Arias, & Steglich, 2016), *density* (Ahn, Garandeau & Rodkin, 2010; Ahn & Rodkin, 2014; Dijkstra, Cillessen, & Borch, 2013), *class size* (Saarento, Kärnä, Hodges, & Salmivalli, 2013), and even *sex ratio* (Zwaan, Dijkstra, & Veenstra, 2013). Although network analysis techniques have not yet been extensively used in analyses of the social status of victims, however, they are in a good position to shed light on more complex aspects of individual- and group-level interactions.

1.2 Objectives and hypotheses

The ecological and biological success of humankind, unique in the animal kingdom, is strongly linked to our species' ultra-sociality and this is largely reliant on our equally hypertrophied prosociality (along with our culture). Although much human sociality and prosociality is parochial and biased by affective bonds, reciprocity and reputational

concerns, humans regularly cooperate anonymously with anonymous people, a behaviour which is normative and enforced cooperatively. We should keep in mind that prosocial (and antisocial) behaviours permeate every corner of people's everyday life, which is inevitably and strongly social, and have a significant impact on the individuals' welfare, health, psychosocial adjustment, and school and career success. So, a better understanding of the proximate (mechanistic) and the ultimate (evolutionary) processes that craft and fuel prosociality has become a major objective that needs to be addressed and that is actually being tackled by research programmes from numerous disciplines within the social and the natural sciences that deal with foundational and applied research questions. The approach adopted in the research reported here is mainly informed by developmental psychology, cognitive psychology and comparative (and evolutionary) psychology.

The present work addresses two grand and largely complementary questions. Prosocial behaviour requires individuals to sacrifice their exclusive access to payoff-maximizing resources, such as desirable rewards, partners, and the services they can provide. Quite often, prosocial behaviour entails individuals spending their time on furthering the psychological welfare and the biological fitness of others while compromising theirs. The question is: Why should an individual engage in such other-regarding oriented behaviours that, at least on the short-term, appear to reduce the actor's own psychological welfare and biological fitness? This is a puzzling question that has long preoccupied psychologists, biologists and other social and natural scientists. The way we come to terms with this grand question in the present work is by investigating the *psychological foundations of altruistic behaviour* (i.e., costly cooperation). More specifically, we analyse the relation of altruistic sharing to inhibitory control, a key executive function believed to be involved in the regulation

(and restraint) of behaviours that violate the selfishness axiom according to which individuals should be designed by natural selection to behave rationally and maximize their personal gains. As already reviewed above, the theoretical background and the empirical evidence for and against the view that prosocial behaviour comes naturally and that it is already in place from a young age are mixed. Nevertheless, our general hypothesis is focused on the relation between altruistic giving and inhibitory control, the latter assessed as a trait. Whereas there is much literature showing that an experimentally controlled transient shortage of self-control tends to be associated with an increase in self-interested behaviour, the number of studies that have tested the specific relation we mean to address here is meagre, though. Anyway, our general hypothesis on this can be stated as follows: *we expect that individuals scoring high on inhibitory control will be more likely to behave altruistically in a Dictator Game* (see Chapter 2 for full details).

Now, human sociality entails individuals navigating a challenging social maze where they are forced to compete and cooperate with other group members for social status (power, prestige, popularity, likeability). In fact, they jockey for the prerogatives associated with social status rather than for status per se. In this scenario, individuals will be seen to form and service payoff-enhancing partnerships and to avoid and dissolve relations that may have a negative impact on the attainment of their personal goals. Within such groups and partnerships individuals have been shown to vary greatly in their social status; thus, some individuals enjoy high positions in the dominance hierarchy and are popular and well-liked, whereas others occupy bottom positions in the dominance ranking and are neglected and disliked. What matters is that this variation in the social status of group members, cashed out in terms of dominance, popularity and likeability, is associated with differences in the behaviour they deploy and receive

which, ultimately, translate into differences in welfare, health, psychosocial adjustment, and academic and work success (and biological fitness). For example, aggression (called antisocial behaviour by some) is positively associated with popularity, prosocial behaviour is positively associated with likeability, and peer victimization is negatively associated with likeability. Although the valence of many of these behaviour-peer status associations has proved robust overall, a number of studies have reported that the strength of these links can vary substantially between groups, though. What does account for this variation across groups? There is growing evidence that variables such as the group's behavioural norms or network structure can and do have a moderating effect on these links. It has been found, for example, that the norm for aggression (or bullying) of entire classrooms or of the subgroups of most popular children or adolescents can impact the levels of social liking or disliking of bullies or victims. The bottom line of these studies is that individuals are sensitive to social norms and this is so because those who do not conform to them (that is, deviants) are more likely to be singled out and targeted for social exclusion. In other words, returning to the second grand question addressed in this research, the *socio-ecological context* where individuals work out their partnerships and their social status does matter a lot because it can mitigate (or exacerbate) the impact of peer victimization and the peers' levels of rejection. The present research then set out to test several assumptions regarding the relation between status constructs (visibility and likeability) and between behaviours (aggression, victimization, and prosocial behaviour), and the behavioural correlates of peer status, and explore several hypotheses bearing on the potentially moderating effects of prosocial (compared to aggression) norms assessed at several group levels, classrooms, most visible peers, and most likeable peers, as well as the effect of the group's network density (these are fully stated in Chapter 3). If we had to single out a

major hypothesis to answer this second grand question, namely, what is the effect of the socio-ecological context on the patterns of association between prosocial behaviour, victimization and peer status, we could state the following: *we predict that prosocial norms will have a greater moderating effect than aggression norms and that the norms of most visible peers will have a greater effect than the norms of entire classrooms, and the norms of most likeable peers on the negative relation of peer victimization to social liking.*

CHAPTER 2: THE ROLE OF INHIBITION IN YOUNG CHILDREN'S ALTRUISTIC BEHAVIOUR

2.1 Introduction

Cooperation, broadly defined as behaviour that increases incumbent individuals' welfare, is thought to be a critical component of the scaffolding that supports sociality, a ubiquitous evolved strategy displayed by so many entities of the natural world, from genomes to social groups (Foster 2011; Novak 2006). However, cooperation may come in a variety of forms and may also be driven by a variety of cognitive systems (Warneken & Tomasello 2009a). A critical challenge to be addressed is to elucidate the nature of the cognitive drivers that underpin different forms of cooperation and to establish its emergence in development and in evolution (Brosnan et al., 2010; Cheney 2011; Hauser et al., 2009; Silk & House 2011; Warneken & Tomasello 2009b).

Human prosociality can be expressed through *mutualism or cooperation*, when both partners increase their immediate benefits; *altruism*, when the recipient obtains a benefit at a cost to the actor; and *altruistic punishment*, when the actor's behaviour is detrimental to both the actor and the recipient but increases third-parties' payoffs (Fehr & Fischbacher 2003). In humans, prosocial behaviour in general and altruism in particular may be expressed through a variety of activities including collaboration (Brownell et al., 2006), sharing resources (Blake & Rand 2010), giving instrumental help (Warneken & Tomasello 2007), providing comfort (Jackson & Tisak 2001) and providing information (Liszkowski et al., 2008). In recent years there has been a flurry of experimental studies aimed to test whether and when children deploy different forms of prosocial behaviour. These studies have implemented a large array of experimental setups including face-to-face interactions between children or between children and adult experimenters, third-person tasks with puppets or dolls, and scenarios in which children are asked to make decisions regarding the sharing of resources with hypothetical partners (Silk & House 2011; Warneken & Tomasello 2009a, 2009b). One

of the approaches adopted in the study of resource allocation decisions consists in asking children to distribute actual resources between themselves or between themselves and others. The latter may be other children or adult experimenters that are present (Blake & McAuliffe 2011; Brownell et al., 2009) or hypothetical (and usually) anonymous partners that are absent (Benenson, Pascoe, & Radmore, 2007; Fehr et al., 2008). The latter setup is typical of economic games such as the Ultimatum Game and the Dictator Game (Lucas et al., 2008; Kogut 2012).

Of the two categories of prosocial behaviour in which the recipient's payoff is increased, namely, mutualism and altruism, only the latter entails a cost to the actor. And giving something away (to others) at a cost to oneself would appear to be cognitively demanding. Perhaps this is why children's altruistic giving takes some time to develop (e.g. Blake & Rand 2010; Kogut 2012; see Hay et al., 1999; House et al., 2012, however), and perhaps this is because it requires the ability to inhibit the natural desire to maximize one's own profits, which also takes time to develop. Along with working memory and cognitive flexibility, among others, inhibitory control is one of the foundational components of executive functioning (Best & Miller 2010; Carlson 2005). Although the ability to inhibit prepotent responses or to activate alternative responses is known to improve with age and although its developmental timeline often varies as a function of the task used to assess it, there is reasonable consensus as to when children first start to master it. Thus, by 3 to 4 years of age, children may already perform well on several inhibition tasks and, as already mentioned, the skill improves with increasing age (Best & Miller 2011; Wiebe et al., 2011).

The goal of the present study was to investigate if altruistic sharing in children aged 4 to 6 was related to executive functioning. We were particularly interested to determine whether altruistic responding was positively associated with inhibitory control in young

children. To our knowledge, nobody has so far addressed this issue empirically. Whereas there are several studies that have documented the occurrence and developmental course of sharing in young children (see House et al., 2012; Silk & House 2011, for reviews), only one has explored the relation between collaboration and inhibitory control (Giannotta et al., 2011) and another has investigated the relation between mentalising (theory-of-mind) skills and prosocial offers in several classes of economic games (Sally & Hill 2006). The one study more closely related to ours, i.e. Giannotta et al.,'s, however, tested 8 to 10-year-olds, and used a structured puzzle task to measure collaboration-based prosocial behaviours, and a Stroop task to measure inhibitory control.

In the present research, we used a resource allocation paradigm and a Dictator Game to assess altruistic sharing. Participants received 10 candies and they were asked if they wanted to donate any of them to an anonymous partner in a one-shot interaction. Proposers (dictators) were also told that their choice would remain confidential both to their imaginary partner and to the experimenter. The child's choice was considered altruistic sharing if she donated at least one candy, as it implied for the child to voluntarily deviate from the maximum profit she could otherwise gain, i.e. 10 candies. We assumed that altruistic sharing engages the ability to restrain the child's natural tendency toward self-interest maximizing and, thus, predicted that altruistic sharing would be more likely among children scoring high on inhibitory control.

2.2 Method

2.2.1 Participants

A total of 72 56 to 79 months-old (mean age = 67.2 months, SD = 5.9) children (32 girls and 40 boys), recruited from a school in Bogotá, Colombia, participated in this study. Only pre-kinder (mean age = 63.0 months, SD= 4.1) and kinder (mean age = 71.7

months, SD= 4.1) children who were willing to participate and whose parents had given their informed consent were finally selected for the study.

2.2.2 Procedure and measures

All of the children were tested individually in a quiet room by a single experimenter. All the data for each child were collected over two sessions in 2 consecutive days. On the first day, participants were tested on two executive function tasks, i.e. a test of inhibitory control and a test of working memory. On the second day, participants were administered a third executive function task, i.e. a test of cognitive flexibility, and finally they played a dictator game. A brief description of the tests follows.

2.2.2.1 Inhibitory control

We administered the day/night task (Gerstadt, Hong & Diamond, 1994). The experimenter first made sure that children understood that the sun comes up in the day and the moon comes out in the night. He then instructed them to say *night* when presented with a card with a sun drawing on it and to say *day* when presented with a card with a moon drawing on it. Before starting the test, the children first had to get at least 3 correct answers out of 4 practice trials. The test itself comprised 16 trials, with eight sun cards and eight moon cards, shown in a fixed random order. Scores were the number of correct trials (out of 16).

2.2.2.2 Working memory

We administered the 8 boxes task (Oh & Lewis, 2008). In this test, the children were first shown a row of eight boxes of various patterns and colours. The experimenter then placed a sticker in one of them and asked the children to remember which box the sticker was put into. While the children were looking away, the boxes were then scrambled. Ten seconds later, the children were asked to pick the correct box. This

experiment was then repeated once with each box, following a pre-established random order. The pattern of each scrambled row was also pre-established randomly. In other words, after each consecutive move, the positions occupied by the boxes were always the same. Scores were the number of correct trials (out of 8).

2.2.2.3 Cognitive flexibility

We administered the Dimensional Change Card Sort (DCCS) (Zelazo et al., 1996). In this task, the children were presented with two vertical target cards, one with a red triangle and the other one with a blue circle. They were then instructed to play a game called the colour game, whereby cards have to be grouped according to the colour of their symbols: the cards with blue symbols must be placed into a box facing the blue circle card, while the cards with the red symbols must go into a box facing the red triangle card. For rehearsal, two blue squares and two red squares were used. After that, the children were told that the rule had changed, and that the cards would now have to be sorted according to the shapes of the symbols, instead of their colours. For the rehearsal of that task, two yellow triangles and two yellow circles were used. In order to pass the rehearsal test, the children had to get at least three fourths of the answers right (for both the colour and the shape games), which they all did. Next, the children were asked to take the trial tests: sorting four blue triangles and four red circles according to shape and then according to color. During both the rehearsal and the test trials, the cards were presented in the same order, which had previously been randomly established, under the constraint that a card could not be presented more than twice in a row. The children were told to always place the cards face down in the boxes, and for both the rehearsal and the trial tests, a written protocol based on Kirkham et al., (2003) was followed. Scoring reflected the number of correct trials (out of 16).

2.2.2.4 Dictator Game

To assess children's altruistic sharing, we made them play a Dictator Game. This is an economic game in which two players unknown to each other are involved. One of them, the proposer or dictator, receives all the tokens and has to decide whether she wants to give any of them away to her partner. In this game, the second player has a passive role and cannot influence the dictator's decisions. Dictator Games involving children use candies or stickers (Benenson, Pascoe, & Radmore, 2007; Gummerum et al., 2010; Lucas et al., 2008) instead of money, which is the usual currency when run on adults (Camerer, 2003). In the present study, candies were used. Before starting the game, all the children were asked whether they liked candies, a question they all answered affirmatively. Next, they were told that they would be given ten candies as a reward for having participated in the previous games, and to count them. They were then explained that they were free to either hold on to them all or give away as many of them as they wanted, to a child from another school they had never met. Each participant was then told to mark an envelope and to place the candies they wanted to keep into it, while the candies to be donated would be placed into an unmarked envelope. The experimenter reminded each child that they were free to give away as many candies as they wanted. Also, the children were told that their decisions would remain anonymous, since the unmarked envelopes would be placed onto a pile of similar-looking ones. Eventually, they were also reminded that the experimenter would leave the room and so would not be able to see them make their decision and place the candies into the envelopes. In order to make sure that they had really understood the rules of the game, the participants were asked whether they were allowed to keep all the candies, keep just a few, or give them all away and also whether someone would look inside the envelopes. Once it was clear that the children had understood the rules, they were left alone in the room with

their candies and the two envelopes. After having allocated the candies, they were given a chance to change their decision. Finally, they got to keep the marked envelopes and watch while the unmarked envelopes were being placed onto a pile of identical ones. Two variables were used to assess this task: the number of candies donated (out of 10) and whether any candies were given away or not.

2.2.3 Data analysis

We carried out exploratory data analysis with the procedure EXAMINE from the SPSS v.19 to compute the descriptive statistics and examine the normality of the distributions. The Shapiro-Wilks statistic showed lack of normality in all variables related to executive function and in the number of candies donated. Due to the lack of normality, correlations were computed using the Spearman's non-parametric procedure. Finally, to examine the effect of variables related to executive function on altruistic sharing, we conducted a binary logistic regression analysis with a hierarchical approach with two blocks of predictor variables. The first block consisted of two socio-demographic variables (sex and grade). We used grade (i.e. pre-kinder and kinder) instead of age because we found no correlation between age and the other variables. In this sample, however, the age distribution of children was not clearly associated to their grade. The second block was composed of the executive function variables (inhibitory control, working memory, and cognitive flexibility). In this analysis, the dependent variable (altruistic sharing) was established by dividing the children in two groups: altruists, who offered at least one candy (44%), and non-altruists, who did not give away any candy (56%).

2.3 Results

Neither the executive function variables, nor the number of candies donated were normally distributed (Table 1). Inhibitory control correlated positively with cognitive flexibility and with number of candies donated ($p < .05$, $r^2 = 0.1$, in both cases, Table 2). Although statistically significant and definite, these correlations were medium, though (i.e. 0.3-0.1, Cohen 1988; Sprinthall 2003). In fact, the Spearman correlation coefficient between inhibitory control and number of candies offered turned non-significant when the analysis was run only on the 32 children who donated at least one candy (rs= -0.143, n= 32; N.S.). Overall, children in this study offered an average of 1.46 candies (out of 10) to their anonymous partner (Table 1). Of the 32 (i.e. 44%) children who did donate at least one candy, their average level of donation was 3.3 (range = 1-6 candies).

Table 2.1 Descriptive statistics and normality tests

Variables	Mean	SD	Asymmetry	Kurtosis	Shapiro-Wilks' test
Age	4,70	0,49	0,08	-0.56	0.98
Inhibitory control	14.30	1.81	-1.43	2.75	0.84 ***
Working memory	7.14	0.79	-0.43	-0.76	0.82***
Cognitive flexibility	9.64	3.23	1.47	0.24	0.52***
Number of candies	1.46	1.87	0.79	-0.94	0.75***

*** p < .001

Table 2.2 Spearman Correlation Coefficients among age, executive function variables, and number of candies donated in the dictator game (N = 72)

	Age	Inhibitory control	Working memory	Cognitive Flexibility	Number of candies
Age	-	-			
Inhibitory control	-.003	-			
Working memory	.210	.206	-	-	
Cognitive flexibility	-.036	.280*	.186		
Number of candies	.007	.276*	-.008	.056	-

*P < .05

The logistic regression revealed that the contribution of the first block (sex and grade) was not statistically significant (χ^2 (2), 72 = 2.70, p = .26). A test of the full model with all five predictors against the first block model was statistically significant (χ^2 (3), 72 = 11.64, p < .01). According to the Wald criterion, only inhibitory control predicted altruistic sharing (p = .008; Table 3). When inhibitory control is raised by one unit, the odds ratio is 1.73 times large and, therefore, children are 1.73 times more likely to belong to the altruist group (Table 3). There was also an effect of sex on altruistic sharing, although this was only marginally statistically significant (p = .054; Table 3); thus, girls were more likely than boys to be in the altruist group. The pseudo R-square of Nagelkerke was .24, and the Hosmer- Lemeshow statistic showed a good fit (p = .39). Classification was adequate with 71.9% of the altruistic children and 75.0% of the non-altruistic children correctly predicted, and an overall success rate of 73.6%.

Table 2.3 Results from the logistic regression on altruistic sharing in Dictator Game.

	B	SE	Wald	df	p-value	Exp(B) (Odds ratios)	CI 95% (odds)
Sex	-1.08	.56	3.72	1	.054	.34	.11 – 1.02
Grade	-0.57	.54	1.12	1	.292	.56	.19 – 1.64
Inhibitory control	0.55	.21	7.13	1	.008	1.73	1.16 – 2.58
Working memory	-.50	.37	1.80	1	.179	.61	.29 – 1.26
Cognitive flexibility	.04	.08	.24	1	.626	1.04	.88 – 1.23
Constant	-4.18	3.26	1.64	1	.200	.02	

2.4 Discussion

Our prediction that levels of altruism and inhibitory control in 4 to 6 year-old children would be positively associated was borne out by the results of the analysis. Nevertheless, this relationship did not show up in the correlational analysis when this was run only on the sample of children who donated at least one candy. The inability to detect a significant relationship between number of candies donated and inhibitory function (and the other executive function variables) may well have been constrained due to the lack of variability in how many candies children donated. Our assessment of altruism in young children was based on their performance in a Dictator Game (DG). Therefore, our measure of prosociality represents costly (or altruistic) sharing: every candy the "dictator" gave away represented both a benefit conferred on the recipient and a cost incurred by the donor. Although the number of children who donated nothing and the overall average number of resources donated in the DG were close to those reported in other DG studies (Benenson, Pascoe, & Radmore, 2007; Blake & Rand 2010; Gummerum et al., 2010; Lucas et al., 2008), however, the children in this study turned out to be stingier both in terms of percentage of non-altruists (i.e. 56 %) and of the overall mean number of resources donated (i.e. 1.46). We found no effect of age (see also Gummerum et al., 2010), but a marginal effect of sex in the direction that has most often been reported in the literature, i.e. girls were more generous than boys (e.g. Benenson, Pascoe, & Radmore, 2007; Blake & Rand 2010; Gummerum et al., 2008; 2010). Resource allocation studies using other paradigms such as the Prosocial Choice Test in which children are forced to choose between two alternative discrete payoffs have reported that young children under 7-8 years of age do not tend to choose altruistic options in a costly sharing game if they play with anonymous partners (Fehr et al.,

2008); however, this age-related effect vanishes or reverses if children play this game in face-to-face contexts with other children (House et al., 2012).

One-shot DGs played between anonymous partners offer the opportunity to test for altruistic prosocial responding while controlling for the effects of reputation and fear of recipient's retaliation (or spite) (e.g. Benenson, Pascoe, & Radmore, 2007; Warneken et al., 2011). In this regard, DGs may indeed help to detect an individual's genuinely altruistic prosociality in sharing (Benenson, Pascoe, & Radmore, 2007). Results in the DG and in its predefined two-option version, i.e. the Prosocial Choice Test (cf. Silk & House 2011), have also been interpreted in terms of the proposer's sensitivity to unfair allocations of resources (e.g. Fehr et al., 2008; Geraci & Surian 2011). And our prediction was premised on the assumption that altruistic prosociality or fairness requires the ability to overcome an arguably natural tendency towards self-maximizing outcomes. As mentioned above, studies on the development of prosociality have yielded mixed results regarding the relationship between age and prosocial responding (Hay & Cook 2007; Silk & House 2011; House et al., 2012) and at least some of the inconsistencies may reflect differences in the prosocial measures analysed and in the methods used to assess them (Jackson & Tisak 2001). If our assumption turns out to be well-grounded, then, the prediction we formulated and subjected to test was justified. And, finally, the results obtained confirm that variation in performance on a task which measures inhibitory control, that is, an individual's ability to refrain from maximizing his or her own gains or from proposing unfair resource allocations is associated with variation in altruistic sharing as measured in a DG.

We did not find any significant relationship between the children's altruistic sharing and their performance on the tasks used to measure two other executive functions, i.e. working memory and cognitive flexibility. This comes as no surprise,

though, as it has been established that different executive function components somewhat follow different developmental trajectories, engage different neural systems, and are affected by diverse experiential factors (see Best & Miller 2010, for a review). Furthermore, performance in one-shot DGs with anonymous partners does not require sophisticated working memory skills or advanced cognitive flexibility especially if, like in this study, "dictators" make their choice quickly and they are not challenged to behave strategically. In effect, a number of studies have shown that prosocial responding is higher when individuals make quicker decisions (Rand et al., 2012; Schulz et al., 2011; this is so even when cooperation is achieved via altruistic punishment, see Smith et al., 2011). It is also thought that interactive settings in which players have repeated encounters with each other so that they are forced to make strategic decisions based on contingent prior interactions are more cognitively demanding. As a matter fact, some comparative psychologists have argued that nonhuman animals are unable to exhibit the patterns of reciprocation or retaliation so characteristic of human cooperation because they lack the cognitive skills to act contingently (e.g. Hauser et al., 2009; see, however, Cheney 2011).

We are well aware that human prosociality can be deployed through different behavioural actions (e.g. collaborating to reach a goal, sharing resources, giving instrumental help, comforting others in distress, providing information; see Warneken & Tomasello 2009a, 2009b) and that they are supported by a variety of motivational, emotional, and cognitive drivers that follow different developmental trajectories (Hay & Cook 2007; Warneken & Tomasello 2009b). The goal of the present study was to investigate one particularly simple, but natural (and frequently occurring) context in which conflicting tendencies may arise: when individuals have to decide between maximizing their personal gains or to forego their own interests in order to benefit

others. The results found in this study add to the growing body of data on the development of human cooperation by documenting a positive relationship between altruistic sharing in a Dictator Game and performance on an inhibitory control task in 4 to 6 year olds. We have assumed that self-maximizing is a natural tendency that conflicts with costly prosociality and that it needs to be tamed or inhibited in order to deploy altruistic sharing.

CHAPTER 3: PEER LIKEABILITY AND VICTIMIZATION IN YOUNG ADOLESCENTS: MODERATING EFFECTS OF DESCRIPTIVE GROUP NORMS FOR AGGRESSION AND PROSOCIAL BEHAVIOR AND NETWORK DENSITY

3.1 Introduction

There is wide consensus that adolescence, the transition stage between childhood and adulthood, spanning from 10 to 24 years of age (Sawyer, Azzopardi, Wickremarathne, & Patton, 2018), is a second period of sensitivity and vulnerability to the many endogenous and exogenous sources of influence that operate at that stage. Adolescence is thus a time window of opportunity to construct the set of capacities that will eventually enable successful physical, psychological and social adjustments to the adult-typical social and cultural niche, but is also a life phase of fragility and risk that can potentially result in failure to become a successful, well-adjusted, and emotionally and socially mature adult individual (Dahl, Allen, Wilbrecht, & Suleiman, 2018). Of particular interest in the present context is the adolescents' heightened attention and susceptibility to social and cultural cues (Blakemore & Mills, 2014; Van Hoorn, Van Dijk, Meuwese, Rieffe, & Crone, 2016; Van Hoorn, Crone, & Van Leijenhorst, 2017).

In effect, adolescence is one of the developmental periods and social contexts in which social relationships are most crucial in a person's lifetime, when youth spend much of their daytime in school and are bound to navigate an increasingly complex social maze of peer relations (Blakemore & Mills, 2014; Brown, 2011; Rubin, Bukowski, & Laursen, 2011). It is at this life stage (individual factor) and in this socializing school context (situational factor) when and where youth's affective and social-cognitive skills are sharpened and deployed to manage the changing and challenging network of social relationships they establish with age-mates. And these are critical because they are likely to have enduring, even lifelong, effects on the incumbent individuals' health, psychosocial adjustment and academic performance (Hawker & Boulton, 2000; McDougall & Vaillancourt, 2015; Mehari & Farrell, 2015; Nesdale &

Zimmer-Gembeck, 2014; Rudolph, Lansford, Agoston, Sugimura, Schwartz, Dodge, Pettit, & Bates, 2014; Vaillancourt, Hymel, & McDougall, 2013; Troop-Gordon, 2017).

3.1.1 Peer social status and behaviour

3.1.1.1 Peer social status

The *social status* of peers in a group (e.g., a classroom) is typically assessed through at least five different (but to a varying extent related) constructs, namely, social dominance, power, popularity, visibility, and likeability. Of particular interest in the present context are popularity, visibility and likeability. *Popularity,* also called perceived popularity, reputation-based popularity, and consensual popularity, is operationalized as the difference between the number of most popular and least popular nominations (reviews in Cillessen & Rose, 2005; Cillessen, Schwartz, & Mayeux, 2011). *Visibility*, also called social impact, prestige, reputation, or prominence, is derived from adding liked most and liked least nominations (Coie, Dodge, & Coppotelli, 1982; Farmer, Hamm, Leung, Lambert, & Gravbelle, 2011; Garandeau, Lee, & Salmivalli, 2014; Knack, Tsar, Vaillancourt, Hymel, & McDougall, 2012; Lee, 2009; Zimmer-Gembeck, Geiger, & Crick, 2005; Zwaan, Dijkstra, & Veenstra, 2013). And, finally, *likeability,* also called sociometric popularity, social preference, acceptance and peer liking, is assessed as the difference between the number of liked most (acceptance) and liked least (rejection) nominations (reviews in Coie & Cillessen, 1993; Cillessen, Schwartz, & Mayeux, 2011). Whereas popularity is related to impact, visibility, reputation, prestige and the like, likeability is more related to affection and peer acceptance or rejection (Cillessen, 2011; Cillessen & Marks, 2011; Prinstein, 2007; Ruschoff, Dijkstra, Veenstra, & Lindenberg, 2015). Popularity and likeability represent two distinct dimensions of peer status as they are generally associated with different behavioural profiles and different adjustment outcomes (see below), they differ in

developmental stability (Peters, Cillessen, Riksen-Walraven, & Haselager, 2010), and they are only moderately correlated. Moreover, the correlation between these two constructs has been found to decline between grades 9th and 12th, i.e., 14-17 year-olds (Mayeux & Cillessen, 2008). Anyway, the correlation between popularity and likeability is highly variable across studies (see Appendix 3.1).

3.1.1.2 Aggression, victimization and prosocial behaviour

Developmental psychologists interested by the study of adolescents' peer relations have traditionally focused mainly on two major behavioural categories, namely, *aggression* and *prosocial* behaviour (Eisenberg, Spinrad, & Knafo.Noam, 2015; Eisenberg, VanSchyndel, & Spinrad, 2016; Lansford, 2018; Malti & Rubin, 2018a). Aggression can be broadly defined as any action intended to harm or decrease the target's welfare and fitness (e.g., Eisner & Malti, 2015; Malti & Rubin, 2018b). In regard to its effects on the victim of aggression, this damage can be physical, psychological or social. Developmental researchers working on adolescents' peer relations and aggression have distinguished two dimensions that allow the identification and study of several aggression subtypes, the *form* of its expression or how it is enacted, namely, overt or covert, and the *function* it fulfills or what it is for, namely, proactive and reactive (Boxer, Tisak, & Goldstein, 2004; Branje & Koot, 2018; Card, Stucky, Sawalani, & Little, 2008; Casper, Card, Nauman, & Toomey, 2017; Crapanzano, Frick, & Terranova, 2010; Frey & Strong, 2017; Little, Jones, Henrich, & Hawley, 2003; Malti & Rubin, 2018b; Ostrov, Perry, & Blakely-McClure, 2018; Polman, de Castro, Koops, van Boxtel, & Merck, 2007; Polman, de Castro, Thomaes, & van Aken, 2009; Sijtsema & Ojanen, 2018). One distinctive form of proactive aggression that emerges especially when young adolescents enter middle-school (early adolescence) is *bullying* (also labeled harassment) and *victimization*, defined as proactive (unprovoked) physical,

verbal, or relational aggressive behaviour that the perpetrator (the bully or offender) uses repeatedly and abusively against a defenseless target (the victim), due to power imbalance, and that is aimed to intentionally cause physical and psychological harm (Coie, Dodge, Terry, & Wright, 1991; David-Ferndon & Simon, 2014; Doll, Song, & Siemers, 2004; Donoghue & Raia-Hawrylak, 2016; Hymel & Swearer, 2015; James, 2010; Juvonen & Graham, 2014; Lansford, 2018; Marini & Volk, 2016; Menesini & Salmivalli, 2017).

Peer victimization is often used interchangeably for bullying or harassment (Graham, 2006) or for being the target of bullying (Haltigan & Vaillancourt, 2017); however, it can also refer more generally to the experience of being the target of others' aggressive behaviour (Card & Hodges, 2008; Hawker & Boulton, 2000). It is reported to be associated with internalizing (depression, anxiety, and suicidal ideation) and externalizing (aggressive, disruptive, attention problems, antisocial behaviour) problems, loneliness, and poor academic achievement (reviews: Casper & Card, 2016; Hawker & Boulton, 2000; Kochenderfer-Ladd & Troop-Gordon, 2010; McDougall & Vaillancourt, 2015; Troop-Gordon, 2017).

Prosocial behaviour can be generally defined as any action intended to benefit or increase the target's welfare and fitness (Choi, Johnson, & Johnson, 2011; Eisenberg, Spinrad, & Knafo-Noam, 2015; Lindenberg, 2006). The benefit rendered can also be physical, psychological, or social. Like aggression, prosocial behaviour can also be proactively or instrumentally used to pursue the attainment of self-interested goals (Boxer, Tisak, & Goldstein, 2004), with potential benefits on third-parties only arising as unintended side effects. In any way, overall prosociality is considered to foster positive feelings and enhance cooperation at a dyadic level and cohesion at a group level (Aikins & Litwack, 2011; Aknin, Van de Vondervoot, & Hamlin, 2018). Overall,

adolescents' prosocial behaviour has been shown to be positively associated with various outcomes, including social competence, academic achievement, well-being and health (Aknin, Van de Vondervoot, & Hamlin, 2018; Caprara, Kanacri, Zuffiano, Gerbino, & Pastorelli, 2015; Chung-Hall & Cheng, 2010, Dunbar, 2018; Griese & Buhs, 2014; Huang, Liu, & Liu, 2016; Schacter & Juvonen, 2018; Traylor, Williams, Kenney, & Hopson, 2016), and, as we will see below, with being well-liked by their peers.

Aggression and prosocial behaviour are thus key components of the behavioural repertoire that adolescents enact to initiate, maintain and terminate their social relationships with peers. And, both behavioural categories have been found to correlate with each other, although the strength and valence of the correlation is highly variable with more reports of negative than positive correlations, nonetheless (see Appendix 3.2). Also, aggression tends to correlate positively with victimization, whereas prosocial behaviour correlates negatively with victimization (Appendix 3.3).

3.1.1.3 Peer social status, aggression and prosocial behaviour

Many studies have assessed the behavioural correlates of the adolescents' peer status in their groups. One of the patterns most commonly reported is that *popularity* (and related constructs, i.e., *prestige*, *impact*, visibility, *dominance* and *power*) correlates positively with *aggression* and negatively with victimization (see Appendix 3.4). As for the relation between popularity and prosocial behaviour, some studies have reported positive correlations and (fewer) others have reported negative correlations between these two variables (see Appendix 3.4). *Likeability* has been found to be negatively associated with *aggression* and with *victimization* (see Appendices 3.5 and 3.7, respectively) and positively with *prosocial behaviour* (see Appendix 3.6).

3.1.2 Peer ecology, social status, aggression and prosocial behaviour

In studies of peer relationships and status based on sociometric methods, for example, peer nominations and ratings (reviews in Coie, Dodge, & Coppotelli, 1982; Cillessen & Marks, 2011; van den Berg, Burk, & Cillessen, 2014), the scores obtained by the students generally reflect the perception that their peers have of their *behaviour* (e.g., how often they engage in aggressive and prosocial interactions as actors and as targets), their *likeability* (acceptance minus rejection), their *visibility* (acceptance plus rejection), and their *popularity* (most popular minus less popular). Interestingly, these perceptions not only reflect the influence of *individual characteristics* of both the participants and their peers, but also, very importantly, of *group characteristics* measured at varying levels (e.g., the subgroup of most popular or most visible peers, the subgroup of most liked, the subgroup of girls or boys, the subgroup of friends, the whole classroom, or the entire school) (Hansen, Steenberg, Palic, & Elklit, 2012; Knack, Tsar, Vaillancourt, Hymel. & McDougall, 2012; Monks, Smith, Naylor, Barter, Ireland, & Coyne, 2009; Salmivalli, 2010; Chaux, Molano, & Podlesky, 2009; Kohm, 2015; Cross & Barnes, 2014; Pöyhönen, Juvonen, & Salmivalli, 2010; Pozzoli & Gipi, 2010; Salmivalli, Voeten, & Poskiparta, 2011, Farmer, Petrin, Robertson, Fraser, Hall, Day, & Dadisman, 2010; Hanish & Guerra, 2000; Wright, Giammarino, & Parad, 1986; Wolters, Knoors, Cillessen, & Verhoeven, 2014; Andrews, Hanish, Fabes, & Martin, 2014; Chung-Hall & Chen, 2010; Duffy & Nesdale, 2009; Isaacs, Voeten, & Salmivalli, 2013; Salmivalli & Voeten, 2004). Although the importance of peer ecology and the group's normative characteristics were acknowledged and incorporated to influential theoretical models by early developmental researchers, for example, when they emphasized the interdependency between the individuals' behaviour and their contexts over the course of their entire lifespans (Bronfenbrenner, 1979; Espelage, 2014; Heft, 2013; Lerner,

Agans, SeSouza, & Gasca, 2013), however, it has been only relatively recently that large-scale empirical testing of specific hypotheses and predictions following from these theoretical models has been undertaken.

3.1.2.1 Behavioural group norms

Of particular interest in the present context are studies that have specifically tackled issues relating to the potentially moderating effects of *behavioural* group norms on the relation between individual behaviour and the peers' social status in different groups. Behavioural group norms can be descriptive (or popular) or injunctive (or prescriptive) (Cialdini, Kalgren, & Reno, 1991). *Descriptive norms* refer to what peers typically do, i.e., the average or central tendency of a behaviour in a given group, whereas *injunctive norms* refer to what peers typically believe they ought to do, i.e., the average or the central tendency of the belief about the appropriateness (approval or disapproval) of a behaviour in a given group. For example, behaving aggressively can be descriptively normative and regarding aggression as an appropriate way of behaving can be injunctively normative. Departures from descriptive or injunctive behavioural norms in a group make the deviant individuals' behaviour or beliefs, respectively, non-normative. And deviants are perhaps more likely to be singled out and subjected to ostracism or targeted by proactive forms of aggression, including overt or covert aggression.

Wright, Giammarino, & Parad (1986) reported that the positive relation between *aggression* and peer *rejection* in elementary school children was moderated by the classroom's norm of aggression (i.e., it was weaker in classrooms with high overall aggression), whereas the positive association between peer *acceptance* and the norm of prosocial behaviour was consistent across classrooms, no matter their level of aggression. Trends of this kind have generally been confirmed in other studies of elementary school children (e.g., Boivin, Dodge, & Coie, 1995; Stormshak, Bierman,

Bruschi, Dodge, & Coie, 1999). Indeed, the amount of adolescent research that has adopted this relational perspective on the contribution of contextual factors to the relation between individual behaviour and peer status and has tested its empirical predictions has recently increased notably.

Chang (2004) found in classrooms of 15 year-old adolescents that the group's normativeness of prosocial behaviour strengthened the positive association between prosocial behaviour and social preference, whereas the classroom level of aggression attenuated the negative association between aggression and social preference. Sentse, Scholte, Salmivalli, & Voeten (2007) reported that especially bullying, but to a lesser extent victimization too, were better accepted in classrooms of 13 year-old adolescents where both behaviours were normative. Kärnä, Voeten, Poskiparta, & Salmivalli (2010) found that the positive association between victimization and peer rejection in 3rd to 5th graders was strengthened in classrooms where the norm for reinforcing bullying was high and the norm for defending victims was low. Isaacs, Voeten, & Salmivalli (2013) studied the effect of three group norms in adolescents 10-13 years of age. One of the group norms was the whole class' level of bullying. They found that the positive association between rejection and peer victimization was heightened in classrooms where a high level of bullying was normative. Boor-Klip, Segers, Hendrickx, & Cillessen (2015) reported that the negative association between overt aggression and social preference in fifth graders was weakened in classrooms where overt aggression was normative. However, the positive association between prosocial behaviour and social preference was unrelated to the classroom's norm for prosocial behaviour (see also Wright et al., 1986). Interestingly, no moderating effect of classroom norms was found for associations between the behaviours analyzed and popularity.

Other approaches to the study of the effect of group norms on behaviour-peer status links have focused on groupings other than the entire classroom. Thus, Dijkstra, Lindenberg, & Veenstra (2008) reported that it was the norm for bullying of the subgroup of most popular, rather than that of the subgroup of non-popular, 13 year-old adolescents what moderated the negative association between bullying and acceptance and the positive association between bullying and rejection. Bullies were better accepted and less rejected in classrooms where the bullying norm of popular peers was higher.

3.1.2.2 Group social networks

Another type of classroom-level characteristics whose impact on behaviour-peer status links has been assessed are indices derived from network analysis (Wasserman & Faust, 1994), such as *embeddedness* (Ahn, Garandeau, & Rodkin, 2010; Moody & White, 2003), *centralization* (Ahn & Rodkin, 2014; Gest, Graham-Bermann, & Hartup, 2001; Meter & Card, 2016; Neal & Cappella, 2012; Serdiouk, Rodkin, Madill, Logis, & Gest, 2015), *hierarchical structure* (Garandeau, Ahn, & Rodkin, 2011; Garandeau, Lee, & Salmivalli, 2014; Martín-Babarro, Díaz-Aguado, Martínez-Arias, & Steglich, 2016; Pattiselanno, Dijkstra, Steglich, Vollebergh, & Veenstra, 2015; Saarento, Garandeau, & Salmivalli, 2014; Saarento & Salnivalli, 2015; Zwaan, Dijkstra, & Veenstra, 2013), *cohesion* (Martín-Babarro, Díaz-Aguado, Martínez-Arias, & Steglich, 2016), *density* (Ahn, Garandeau & Rodkin, 2010; Ahn & Rodkin, 2014; Dijkstra, Cillessen, & Borch, 2013; Sijtsema, Ojanen, Veenstra, Lindenberg, Hawley, & Little, 2009), *class size* (Saarento, Kärnä, Hodges, & Salmivalli, 2013), and even *sex ratio* (Zwaan et al., 2013). With regards to density, for example, an index of how well students are connected to everyone else in the classroom, Ahn and colleagues (2010) found that victimized children were less unpopular in classrooms with high density (classmates highly

connected); conversely, aggressive children were more disliked in classrooms low in density.

3.1.3 The present study: objectives and hypotheses

The primary goal of the present study is to examine whether a group's behavioural descriptive norms can have a moderating effect on the association between peer victimization and likeability. We first examine the relation between the two constructs of peer status assessed and, based on previous work, which also includes the construct perceived popularity (Cillessen & Mayeux, 2004; Coie, Dodge, & Coppotelli, 1982; LaFontana & Cillessen, 1998; Newcomb & Bukowski, 1983; Parkhurst & Hopmeyer, 1998; Zwaan et al., 2013), we predict that they will be moderately correlated (see above: 3.1.1 and Appendix 3.1). In fact, this assumption is critical to one of the specific objectives and hypotheses addressed in the present study, namely, that the visibility norms are more influential than the likeability norms (see below). In this regard, a low correlation between these constructs would provide a more robust test of this hypothesis. Next we explore the relation between the two behavioural measures assessed, namely, aggression and prosocial behaviour. Based on previous research (see above: 3.1.2 and Appendix 3.2), we predict that aggression and prosocial behaviour will be negatively correlated. We then turn to the behavioural correlates of likeability and visibility, that is, the valence and strength of the association of aggression, victimization, and prosocial behaviour with likeability, on the one hand, and with visibility, on the other. Based on prior work (see above: 3.1.3 and Appendices 3.3-3.6), we predict that prosocial behaviour will be more strongly and positively associated with likeability than with visibility and that aggression will be negatively associated with likeability, but positively associated with visibility. In the present study, however, we are particularly concerned with the likeability-victimization link, which has often been

reported to be negative (see above: 3.1.3 and Appendix 3.7), as we aim to establish if this negative link can be moderated by the norms for aggression and for prosocial behaviour of the entire classroom, of the subgroup of most liked peers and of the subgroup of most visible peers.

We next tackle the analysis of four hypotheses, as we are concerned with four dimensions of group context: *norm* level (entire class versus subgroups within classrooms), *status* type (likeability versus visibility), *behaviour* category (aggression versus prosocial behaviour), and *network* characteristics (density). In the hypotheses that follow, we assess the potentially moderating effect of each of these four groups context-related variables on the negative relation between likeability and peer victimization. The first hypothesis predicts that *subgroups*' norms are more influential than entire *classrooms*' norms. This hypothesis is predicated on the assumption that within classrooms youth are more strongly influenced by specific subgroups of peers, even if only because the classroom's structure typically consists of subgroups and students tend to engage in interactions with peers only or mostly from subgroups they are members of. Dijkstra, Lindenberg, & Veenstra (2008) reported that the behavioural norm (of proactive aggression, i.e., bullying) of the subgroup of most popular students was more influential on the students' status of acceptance and rejection than when this behavioural norm was assessed at the level of the entire classroom (see also McGuire, Rutland, & Nesdale, 2015). The second hypothesis posits that *visibility* norms are more influential than *likeability* norms in moderating the negative association between likeability and victimization. This hypothesis is predicated on the assumption that youth are more strongly influenced by peers scoring high on visibility (or reputational popularity) than on likeability (e.g., Cillessen, 2011). The third hypothesis proposes that the norms for *prosocial* behaviour are more influential than the norms for *aggression*.

The foundation for this hypothesis is mixed, though. If popularity (or visibility) is claimed to be more influential than likeability (hypothesis 2), and popularity tends to be more strongly associated with aggression than with prosocial behaviour (see above: 3.1.3), then our hypothesis should predict that aggression norms would have a greater influence than prosocial norms. However, one might counter this with the argument that given that prosociality is more strongly related to likeability than to visibility (see above: 3.1.3) and since our study is concerned with the link between likeability and peer victimization, it seems reasonable to suggest that prosocial behaviour can have greater impact than aggression on this specific behaviour-status link. Finally, our fourth hypothesis tests for the effects of group density. Here we predict that the likeability-victimization negative association could be stronger in groups where members are poorly connected (with low density). We reasoned that perhaps highly victimized peers are likely to be more disliked in groups where they have fewer connections. Nevertheless, in the only other study where this effect was analysed, Ann et al. (2010) failed to find any significant relation between classroom-level density and the relation between likeability and peer victimization, although, they reported that aggressive peers were more disliked in classrooms with low density.

3.2. Method

3.2.1 Participants

Participants were 6,600 students (M_{age} = 13.1 years, *SD* = 0.6; 49.2 % girls) from 269 classrooms (average class size 24.54 students, SD = 4.77) in 81 secondary schools from two regions of central Spain. Only students who assented to participate and whose parents provided active informed consent were included in this study. Participants completed an online-based questionnaire during regular school hours in one 50-minute session. This questionnaire was part of a larger-scale survey carried out with the

SOCIESCUELA application (Martín-Babarro, 2014), which aimed to assess the characteristics and level of violence at schools in the two regions aforementioned.

3.2.2 Procedure

During each session two research assistants gave instructions on how to complete the questionnaire and assured the students that their answers would remain confidential. All the information was peer reported and based on peer nominations within classrooms. Students were shown a matrix with their classmates' names and photos and indicated their responses to the questionnaire items by selecting the pictures of the chosen classmates. This computer-based sociometric procedure enabled the participants to even nominate absent classmates and made it possible to work out indices of aggression, prosocial behaviour and victimization for all the students in the 269 classrooms, without exception.

3.2.3 Measures

3.2.3.1 Gender

This measure was dummy coded (girl = 1, N= 3,250; boy = 0, N= 3,350).

3.2.3.2 Victimization

This was obtained through a peer-nomination method with no limit in the nominations number, which yielded three measures of victimization: *physical* (e.g., "Which of your classmates are often pushed around or beaten by other students?") *verbal* (e.g., "Which of your classmates are regularly made fun of or insulted?") and *relational* (e.g., "Which of your classmates are usually ignored or ostracized?"). For each question the number of nominations that each student received was divided by the number of students who had answered the question and then, the three values (physical, verbal and relational

victimization) (Cronbach's α = 0.79) were added and divided by three (range from 0 to 0.96; *M* = 0.05; SD = 0.11). Finally, the victimization index was z-standardized.

3.2.3.3 Likeability

This index reflects how well a child is liked by his or her peers within the classroom, as it integrates rejection (least-liked nominations) and acceptance (most-liked nominations) into a single variable. The index of acceptance was estimated from the students' nominations (up to nine classmates in each case) to the following question, "Which classmates do you like to sit with?" Similarly, the rejection index was assessed with a question about the classmates, "Whom *you* would least like to sit with?" The total number of nominations obtained by each student in each category was divided by the number of students who responded to that question. The likeability index was obtained by subtracting the rejection index from the acceptance index (range from -0.96 to 0.88; M= 0.15; SD = 0.32) and converted to a *z*-score.

3.2.3.4 Visibility

This was defined as the number of most liked nominations *plus* the number of least liked nominations received by each participant (range from 0 to 1.64; *M* = 0.63; SD = 0.23). As for likeability, this index was z-transformed within the classroom.

3.2.3.5 Prosocial behaviour

This was assessed by asking students which of their classmates: i) treated their classmates well, ii) helped their classmates, and iii) got on well with the teachers (Cronbach's α = .85); with a limit of three nominations in each case. This allowed calculation of a prosociality index for each student. To do this the number of nominations a student received in each category was divided by the number of respondents to the relevant question. Next, the obtained scores in the three questions

were added and divided by three (range from 0 to 0.84; M = 0.11; SD = 0.12) and z-transformed. We used aggregated individual measures to construct three measures of classroom prosociality: the *classroom* norm was defined as the mean of individual indices of prosociality for a given classroom, the *likeability* norm was defined as the mean prosociality of the most liked students' (those who obtained scores at least one *SD* above the mean in the likeability index), and the *visibility* norm defined as the mean prosociality of the most salient peers (those who obtained scores at least one *SD* above the mean in the visibility index).

3.2.3.6 Aggression

This index was based on three parameters analogous to those used in prosociality: which of their classmates i) treated their classmates bad, ii) bothered their classmates, and iii) got on badly with the teachers (Cronbach's $\alpha = 0.84$), with a limit of three nominations too. The number of nominations a student received in each category was divided by the number of respondents to the relevant question and the obtained scores in the three questions were added and divided by three (range from 0 to 0.91; $M = 0.09$; SD = 0.14), and then transformed into *z*-scores. From these data we estimated the *classroom* norm, *the likeability* norm and *the visibility* norm for aggression in the same way as done for the three prosociality norms (see above).

3.2.3.7 Density

This construct captures the average level of connectivity between the members of a group (Wasserman & Faust, 1994). It was assessed by asking each student to choose between up to nine classmates, which ones they were friends with. The final score corresponds to the total number of nominations received by all the group members divided by the maximum number of possible nominations in each group. Higher values indicate that there are many connections among group members and consequently the

group is said to be highly dense. Density was calculated for all groups (range = -0.99 to 0.02; *M* = 0.67; *SD* = 0.09). These scores were z-standardized.

3.2.4 Analysis

The raw data analyzed in this study were nested and non-independent, that is, there were scores of individuals (N= 6,600 students) within classrooms (N= 269 groups). Thus, we used hierarchical or multilevel regression analyses that are suited to deal with such kind of data (Snijders & Bosker, 1999), where individual-based scores represent level-1 variables (i.e., gender, victimization, aggression, prosocial behaviour, likeability and visibility in the present study) and group-based scores represent level-2 variables (i.e., class norms, likeability norms and visibility norms for prosocial behaviour and for aggression in this study). We carried out seven multilevel analyses using the HLM7 program (Raudenbush, Bryk, & Congdon, 2010). The dependent variable in this study was peer likeability and its relation to victimization. *Model 1* investigated the effect of individual victimization on likeability, while controlling for gender. Models 2 to 7 explored the potentially moderating effects on the likeability-victimization link of the following seven level-2 variables: density (in all models), prosocial group norms (*model 2*: mean classroom level of prosocial behaviour; *model 3*: mean level of prosocial behaviour of most liked students; *model 4*: mean level of prosocial behaviour of most visible students, and aggression group norms; *model 5*: mean classroom level of aggression; *model 6*: mean level of aggression of most liked students; *model 7*: mean level of aggression of most visible students. Tests of models 2 to 7 also included the analysis of the corresponding two-way and three-way interactions that, in many cases, involved cross-level interactions (see Table 3.3).

To assess how well each model fit the data we calculated the deviance and the decrease in deviance that in this study involved comparisons of models 2 to 7 with model 1. The decrease in deviance has approximately a chi-square distribution with the degrees of freedom equal to the difference in the number of parameters for the two models compared. A significant decrease in deviance is thus interpreted as a significant improvement of fit of the model (Salmivalli & Voeten, 2004; Dijkstra, Lindenberg, & Veenstra, 2008). We run Student-t tests to compare boys versus girls on the scores obtained in all in the student-level variables (N = 6,500 students) and Pearson correlations between student-level variables and between group-level variables (N = 269 classrooms).

3.3 Results

3.3.1 Student-level variables: Descriptive statistics and correlations

Table 3.1 provides the means and standard deviations of all the student-level variables for boys and girls separately. Girls scored higher than boys on likeability ($t(6598) = -7.66$, $p < .001$) and prosociality ($t(6598) = -19.58$, $p < .001$); whereas boys scored higher than girls on visibility ($t(6598) = 9.68$, $p < .001$), aggression ($t(6598) = 22.62$, $p < .001$), and victimization ($t(6598) = 10.81$, $p < .001$). Table 1 also shows the correlations between the five individual variables for girls and boys separately. Overall, 19 of 20 correlations turned out to be statistically significant ($p< .05$). The only non-significant correlation was between likeability and visibility, and only in boys. Nevertheless, although the correlation between these two status measures in girls was statistically significant, the effect size was low indeed ($r^2= .0071$).

In both genders aggression and victimization correlated *positively* and significantly, although the effect size was low (i.e., $r^2= .0014$ in boys and .0139 in girls). In contrast,

also in both genders the correlations between the two aggression-based measures and prosocial behaviour were *negative* and statistically significant, though, again with low effect sizes, particularly in the case of victimization vs prosocial behaviour (i.e., r^2= .0067 in boys and .0100 in girls). The strength of the *negative* correlation between aggression and prosocial behaviour was remarkable, particularly in boys (i.e., r^2= .0942 in boys versus .0420 in girls).

Table 3.1 Descriptive Z scores and correlations among individual-level variables

	Girls (*n* = 3,250)	Boys (*n* = 3,350)	Correlation				
	X (*SD*)	*X* (*SD*)	1	2	3	4	5
1. Victimization	0.03 (0.09)	0.060 (0.13)		0.118***	-0.100***	-0.436***	0.132***
2. Aggression	-0.26 (.62)	0.26 (1.12)	0.037*		-0.205***	-0.299***	0.230***
3. Prosociality	0.25 (1.12)	-0.24 (0.80)	-0.082***	-0.307***		0.456***	0.250***
4. Likeability	0.17 (1.71)	-0.17 (1.87)	-0.396***	-0.418***	0.417***		0.084***
5. Visibility	0.61 (0.23)	0.66 (0.23)	0.049**	0.298***	0.134***	-0.006	

†*p* <0.10. **p* < 0.05. ** *p* < 0.01. ****p* <0.001.

Girls above the diagonal, boys below the diagonal.

In both genders aggression and victimization correlated positively with visibility and negatively with likeability, although effect sizes were larger with likeability than visibility (victimization-likeability vs victimization-visibility: r^2= .1568 vs .0024 in boys and .1901 vs .0174 in girls; aggression-likeability vs aggression-visibility: r^2= .1747 vs .0888 in boys and .0894 vs .0529 in girls). Prosocial behaviour correlated positively with likeability and visibility, although the association was stronger with the former than the latter (r^2= .1739 vs 0180 in boys and .2079 vs .0625 in girls).

Fig. 3.1 shows that across classrooms (N = 269) peer victimization correlated negatively with likeability. In 96% (N = 257) of all classrooms, the correlation between likeability and level of victimization was negative, and in 70% (N = 189) this negative correlation ranged from - 0.3 to - 0.7.

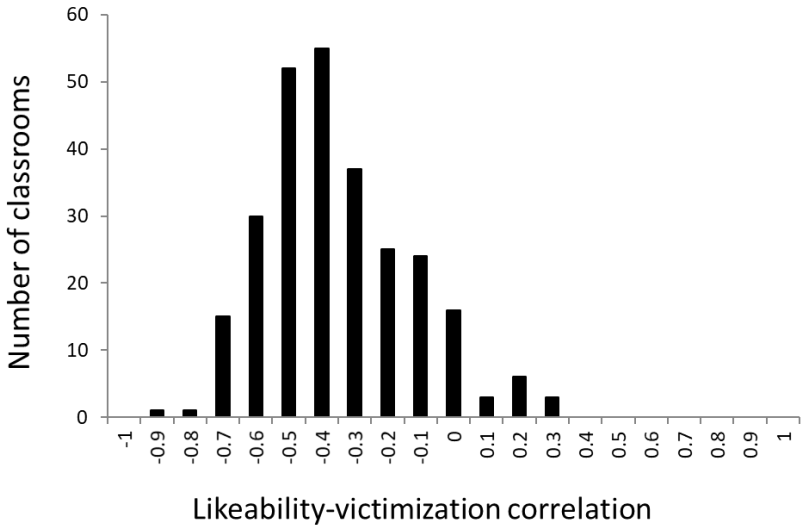

Figure 3.1 Frequency distribution of correlation coefficients between individual victimization and likeability in 269 classrooms.

3.3.2 Class-level variables: Correlations

Table 3.2 presents the correlations between the 7 group-level variables examined in this study. Of 21 correlations run, 13 reached statistical significance ($p < .05$), and 15 were positive. Class-norms were highly inter-correlated (P*CN* vs A*CN*, $r^2 = .7674$), then were visibility-norms (P*VN* vs A*VN*, $r^2 = .6839$); likeability-norms were poorly inter-correlated (P*LN* vs A*LN*, $r^2 = .0053$). Class-norms correlated strongly with visibility-norms (PCN vs PVN, $r^2 = .7430$; PCN vs AVN, $r^2 = .5670$; ACN vs AVN, $r^2 = .5746$) and only weakly with likeability-norms (PCN vs PLN, $r^2 = .0600$; PCN vs ALN, $r^2 = .0139$; ACN vs ALN $r^2 = .0299$). Prosocial norms inter-correlated more strongly than aggression norms did (*P*CN vs *P*LN, $r^2 = .0600$ and *A*CN vs *A*LN, $r^2 = .0299$; *P*CN vs

*P*VN, r^2= .7439 and *A*CN vs *A*VN, r^2= .5746; *P*LN vs *P*VN, r^2= .0529 and *A*LN vs *A*VN, r^2= .0046). The highest correlations between prosocial norms and aggression norms were those involving the class-level (PCN vs ACN, r^2= .7674) and the subgroup of most visible students (PVN vs AVN, r^2= .6839).

Table 3.2 Correlation coefficients among group-level variables.

variables (*N* = 269)	1	2	3	4	5	6	7
1. Prosocial class-norm, PCN	-						
2. Prosocial likeability-norm, PLN	0 .245***	-					
3. Prosocial visibility-norm, PVN	0 .862***	0.230***	-				
4. Aggression class-norm, ACN	0.876***	0.214**	0.269***	-			
5. Aggression likeability-norm, ALN	0.118†	-0.073	0.073	0.173***	-		
6. Aggression visibility-norm, AVN	0.753***	0 .209**	0.827***	0.758***	0.068	-	
7. Network Density, ND	-0.102†	0.033	-0.075	-0.144*	-0.113*	-0.031	-

†p <0.10. *p < 0.05. ** p < 0.01. ***p < 0.001.

3.3.3 Multilevel Analyses

Table 3.3 describes the results obtained in each of the seven models tested. Model 1 shows that victimization was negatively related to likeability (b = -0.725, t(6590) = -22.43, p < .001). It also shows that gender was positively related to likeability (b = 0.251, t(6590) = 4.87, p < .001). Models 2 and 4 show that both the Prosocial Class-Norm (PCN: b = 0.149, t(6590) = 4.83, p < .001) as well as the Prosocial Visibility-Norm (PVN: b = 1.462, t(6590) = 4.36, p < .001) weakened the negative impact of victimization on likeability (Figs. 3.2 and 3.3, respectively). In contrast, the Prosocial

Likeability-Norm (model 3) appeared to have only a marginal impact on the victimization-likeability link (PLN: $b = 0.060$, $t(6590) = 1.87$, $p < .10$).

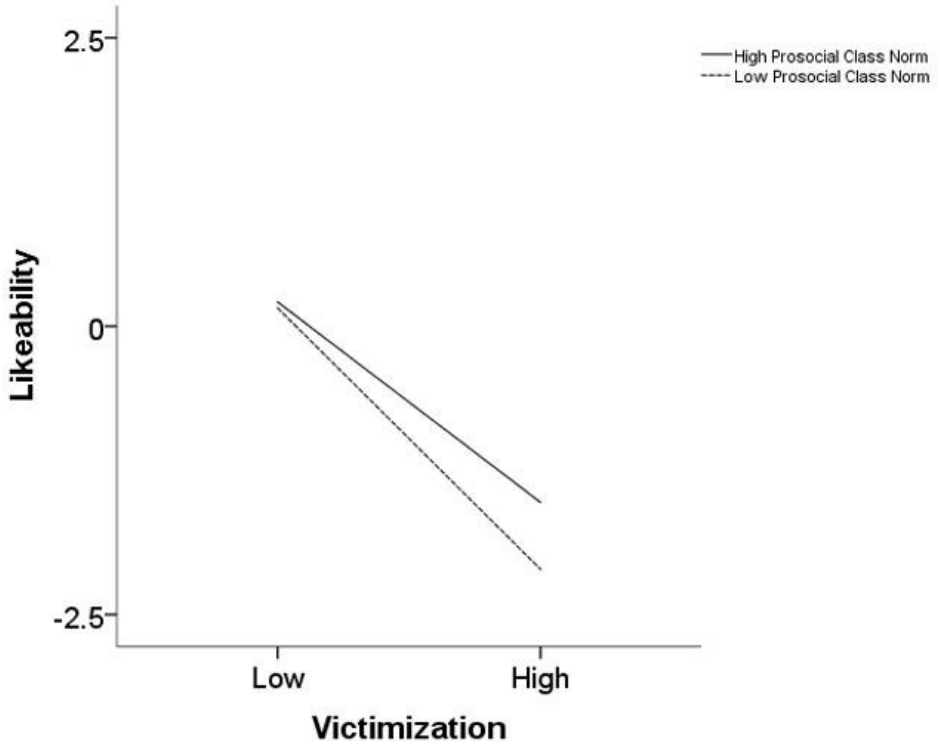

Figure 3.2 Effect of prosocial class-norm on the negative impact of individual victimization on likeability. The plots are presented following Aiken & West's (1991) guidelines (i.e., Low: –1 *SD* below the mean and High: +1 *SD* above the mean).

The impact of the three categories of group norms for aggression was explored in models 5 through 7 (see Table 3.3). The analyses show that only the Aggression Norm of most visible students (model 7) did have a significant effect on the relation between individual victimization and likeability (AVN: $b = 1.740$, $t(6590) = 3.82$, $p < .001$), and this was one of attenuating such relation (Fig. 3.4).

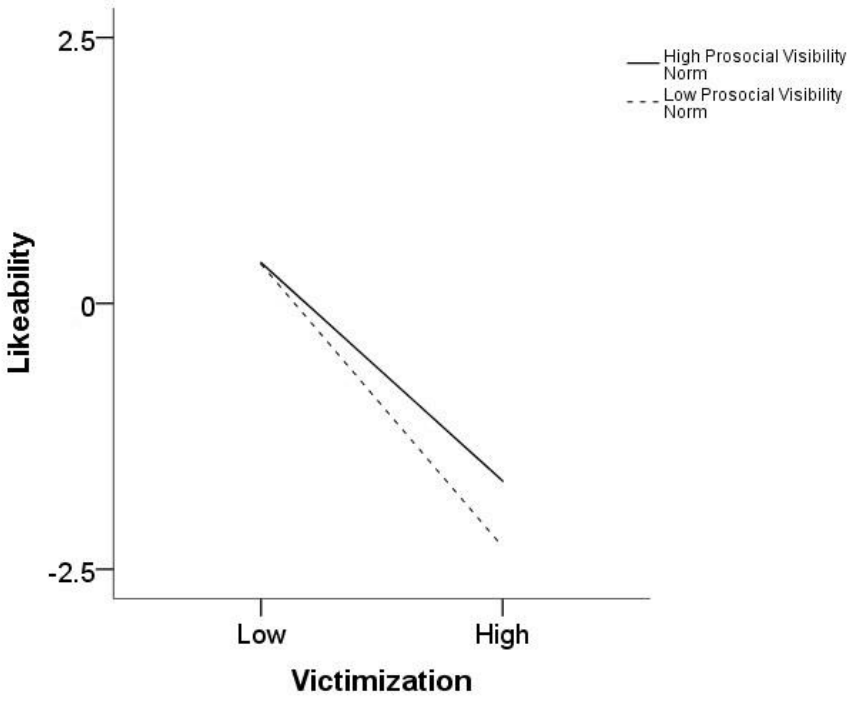

Figure 3.3 Effect of prosocial visibility-norm on the negative impact of individual victimization on likeability. Low: –1 SD below the mean and high: +1 SD above the mean.

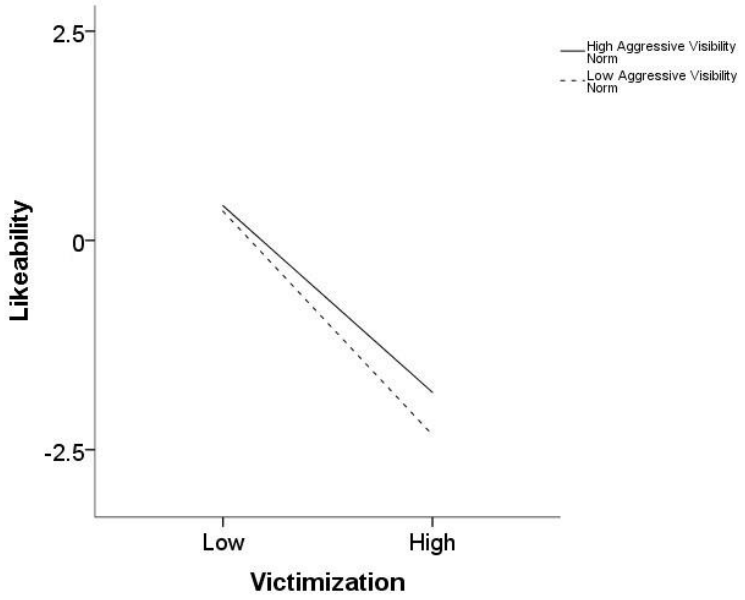

Figure 3.4 Effect of aggression visibility-norm on the negative impact of individual victimization on likeability. Low: –1 SD below the mean and high: +1 SD above the mean.

3.3.4 Effect of Network Density

The effect of network density on the relation between likeability, victimization and group norms for prosocial behaviour and aggression was explored in models 2 through 7. Table 3.3 shows that this three-way interaction only reached statistical significance in the analyses involving the Prosocial Class-Norm (PCN: b = 0.062, t(6590) = 2.91, p < .001) and the Prosocial Visibility-Norm (PVN: b = 0.600, t(6590) = -2.60, p < .01). These effects are depicted in Figs. 3.5 and 3.6. The Aggression Visibility-Norm also had some effect, however, this was only marginally statistically significant (AVN: b = 0.768, t(6590) = 1.96, p < .10; Table 3.3).

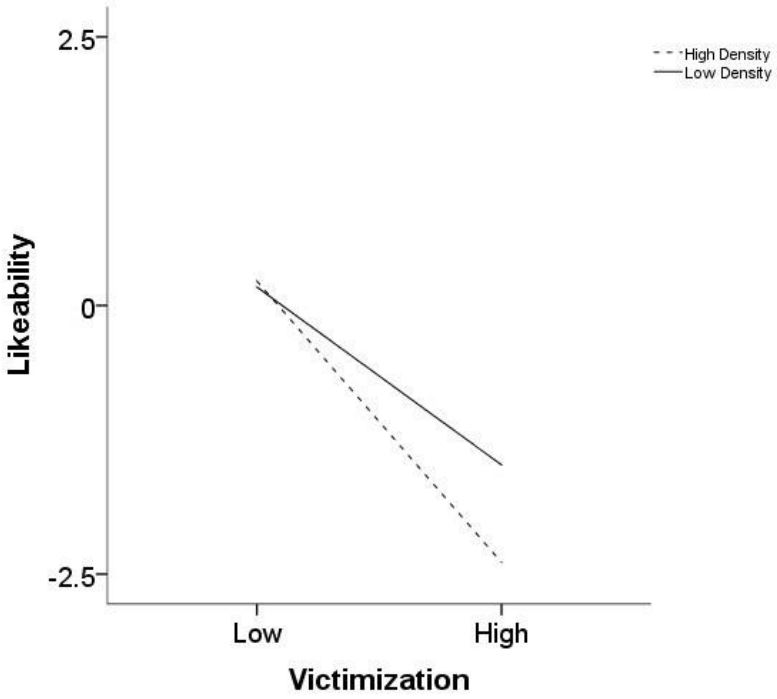

Figure 3.5 Effect of social network density on the negative impact of individual victimization on likeability. Low: –1 SD below the mean and high: +1 SD above the mean.

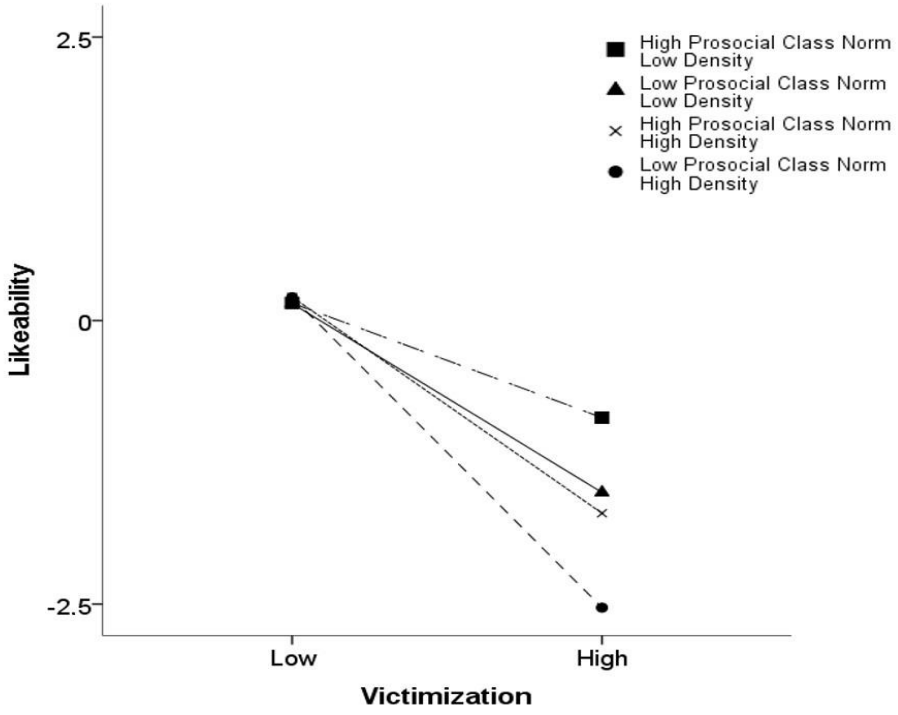

Figure 3.6 Effect of social network density on the relationship between prosocial class-norm, individual victimization and likeability. Low: –1 SD below the mean and high: +1 SD above the mean

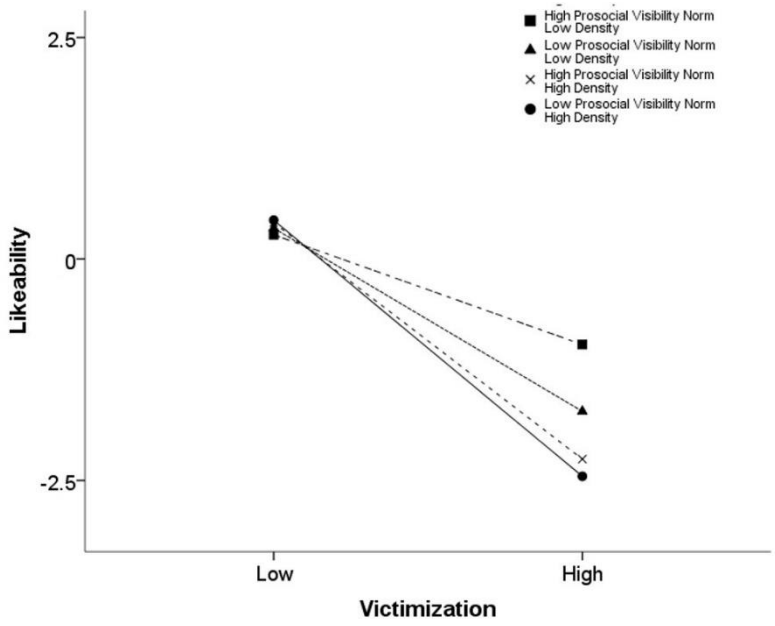

Figure 3.7 Effect of social network density on the relationship between prosocial visibility-norm, individual victimization and likeability. Low: –1 SD below the mean and high: +1 SD above the mean.

Table 3.3 Results of multilevel regression analyses for likeability ($N = 6600$)

	Model 1			Model 2			Model 3			Model 4		
	Gender Individual victimization			Gender Individual victimization Prosocial CN Density			Gender Individul victimization Prosocial LN Density			Gender Individual victimization Prosocial VN Density		
Variable	Y	SE	t	Y	SE	t	Y	SE	t	Y	SE	t
Intercept	-0.124	0.028	-4.40***	-0.120	0.028	-4.28***	-0.126	0.028	-4.48***	-0.112	0.026	-4.11***
Gender (1=girl)	0.251	0.052	4.87***	0.240	0.051	4.63***	0.250	0.052	4.82***	0.230	0.051	4.47***
Victimization	-0.725	0.032	-22.43***	-0.738	0.029	-25.25***	-0.738	0.033	-22.24***	-0.782	0.032	-21.62***
Gender x Victimization	0.016	0.040	0.41	-0.022	0.056	-0.400	0.017	0.059	0.28	-0.020	0.060	-0.33
Density				-0.013	0.009	-1.36	-0.016	0.010	-1.65†	-0.002	0.002	1.49
Victimization x Density				-0.099	0.028	-3.49***	0.060	0.032	1.87†	-0.135	0,037	-3.64***
Prosocial CN				0.057	0.011	5.23***						
Prosocial CN x Density				0.005	0.011	0.45						
Victimization X Prosocial CN				0.149	0.031	4.83***						
Victimization x Prosocial CN x Density				0.062	0.021	2.91**						
Prosocial LN							0.012	0.011	1.14			
Prosocial LN x Density							0.002	0.010	0.22			
Victimization X Prosocial LN							0.060	0.032	1.87†			
Victimization x Prosocial LN x Density							0.017	0.032	0.52			
Prosocial VN										0.052	0.024	2.24*
Prosocial VN x Density										0.000	0.019	0.01
Victimization X Prosocial VN										1.462	0.335	4.36***
Victimization x Prosocial VN x Density										0.600	0.231	2.60**
Deviance			6.432			6.389			3.372			3.398
Decrease in deviance			**318 (25)*****			43 (3)***			60 (5)***			38 (2)***

CN = Class-norm; LN = likeability-norm; VN = Visibility-Norm

Table 3.3 Results of multilevel regression analyses for likeability (*N* = 6600)

	Model 5			Model 6			Model 7		
	Gender			Gender			Gender		
	Individual victimization			Individual victimization			Individual victimization		
	Aggression CN			Aggression LN			Aggression VN		
	Density			Density			Density		
Variable	Y	SE	t	Y	SE	t	Y	SE	t
Intercept	-0.124	0.028	-4.45***	-0.125	0.028	-0.51***	-0.1140	0.026	-4.45***
Gender (1=girl)	0.251	0.052	4.85***	0.250	0.052	4.84***	0.233	0.052	4.51***
Victimization	-0.748	0.033	-22.55***	-0.743	0.032	-23.07***	-0.781	0.031	-24.7***
Gender x Victimization	0.015	0.059	0.25	0.011	0.057	0.19	-0.015	0.058	-0.26
Density	-0.006	0.010	-0.60	-0.134	0.010	-1.35	-0.002	0.002	-1.23
Victimization x Density	-0.102	0.032	-3.19***	-0.113	0.029	-3.90***	0.146	0.032	-4.60***
Aggression CN	0.049	0.011	4.37***						
Aggression CN x Density	0.004	0.010	0.41						
Victimization X Aggression CN	0.066	0.041	1.61						
Victimization x Aggression CN x Density	-0.024	0.031	-0.78						
Aggression LN				0.016	0.011	1.56			
Aggression LN x Density				-0.008	0.012	-0.65			
Victimization X Aggression LN				-0.043	0.033	-1.33			
Victimization x Aggression LN x Density				-0.029	0.027	-1.08			
Aggression VN							0.053	0.026	2.07*
Aggression VN x Density							-0.018	0.027	-0.65
Victimization X Aggression VN							1.740	0.457	3.82***
Victimization x Aggression VN x Density							0.768	0.392	1.96†
Deviance			6.375			6.369			6.385
Decrease in deviance			**52 (3) *****			**63 (2) *****			**47 (3) *****

CN = Class-norm; LN = likeability-norm; VN = Visibility-Norm
†p <.10. *p < .05. ** p < .01. ***p < .001

3.3.5 Deviance

Table 3.3 shows that all the models that tested the effect of some group norm (for prosociality and for aggression) on the likeability-peer victimization association, in addition to network density, fit the data better than the model which only tested the individual effect of victimization (model 1).

3.4 Discussion

In essence, this paper is about peer victimization and its relation to likeability (social acceptance and rejection) in 13 years-old adolescents and about how this negative association can be moderated in groups (whole classrooms) and in subgroups (of popular and likeable adolescents) that vary in their descriptive norms for aggression and for prosocial behaviour and in their network density (number of ties within classroom). Before we discuss the results obtained in the tests of the four hypotheses addressed in the present research it seems appropriate to examine the results obtained in the analyses of several key assumptions.

3.4.1 Testing the assumptions

Although assessed differently, social impact or visibility is typically regarded as a marker of popularity (Cillessen & Marks, 2011). Studies that have explored the association between *popularity* and *likeability* have reported that the strength of this link tends to be moderate to high in early adolescence, and low to moderate in middle adolescence (e.g., Cillessen, 2011; Cillessen & Mayeux, 2011). Actually, though, the correlation between popularity (or impact and visibility) and likeability (or any of its two components, that is, acceptance and rejection) has been shown to be positive, variability across studies is high (see Appendix 3.1). In the present study, however, we found no correlation between visibility and likeability in boys (r = -0.006) and although

the correlation was positive and even reached statistical significance in girls, the amount of variation accounted for was indeed meagre (i.e., $r^2 = 0.0077$; see Table 3.1). As we can see, this result is at odds with the modal correlation between these two constructs reported in the literature (Appendix 3.1). However, testing this assumption was of particular interest in the present research as we set out to test hypotheses regarding the differential effect of behavioural norms of the subgroups of *most visible* versus *most likeable* students within classrooms (see below, hypothesis 2). Therefore, the near zero correlation found between visibility and likeability in the current study provided a particularly good opportunity to test that hypothesis.

Previous research on the relation between *aggression* and *prosocial behaviour* has reported that these two behavioural categories are more likely to correlate negatively than positively, with the strength of the correlations being highly variable (Appendix 3.2). Our analyses fit well with the pattern reported in the literature as we also found that aggression correlated negatively with prosocial behaviour (Table 3.1), although the amount of variation accounted for was rather small (r^2= .0894 in girls and .0942 in boys). The studies that have assessed the association between *aggression* and *victimization* have reported typically low to moderate positive correlations, although the extent of variation has again been found to be large (Appendix 3.3). Here we also found a statistically significant positive correlation between aggression and victimization (Table 3.1), although the effect sizes were very low (r^2= .0139 in girls and .0014 in boys). Fewer have been the studies that have reported correlations between peer *victimization* and *prosocial behaviour*, and these have turned out to be negative (Appendix 3.3). Here the correlation between these two peer-reported behavioural categories was statistically significant, positive for girls and negative for boys (Table

3.1), although in both cases the effect sizes were very small (r^2= .0100 in girls and .0067 in boys).

Although the construct peer-perceived *visibility* has not been assessed as often as the construct peer-perceived *popularity*, both have been claimed to be conceptually analogous and have been found to correlate positively (Cillessen, 2011; Cillessen & Marks, 2011; Clifford, 1963; Li & Wright, 2014; Mayeux, 2014; Parkhurst & Hopmeyer, 1998; Pellegrini, Roseth, Ryzin, & Solberg, 2011; Peters, Cillessen, Riksen-Walraven, & Haselager, 2010; Ruschoff, Dijkstra, Veenstra, & Lindenberg, 2015; Sandstrom, 2011; Zwaan, Dijkstra, & Veenstra, 2013). And *popularity* has been reported to correlate positively with *aggression* (Appendix 3.4). Previous research has also found that *popularity* correlates negatively with peer *victimization* (Appendix 3.4). As for the association between *popularity* and *prosocial behaviour*, the valence and strength of the correlation have been mixed and variable, although there are more studies where the correlation was positive than negative (Appendix 3.4). In the present study, *visibility* was found to correlate positively and significantly with *aggression*, *victimization* and *prosocial behaviour* (Table 3.1), although the effect sizes were small in all cases (average r^2 = 0.0333) and ranged from 0.0024 to 0.0864.

Prior work has found that *likeability* correlates negatively both with *aggression* (Appendix 3.5) and with *victimization* (see below: 3.4.4). A positive association between *likeability* and *prosocial behaviour* has been reported in several studies (Appendix 3.6). In the present study, *likeability* correlated negatively with *aggression*, but positively with *prosocial behaviour* (Table 3.1), that is, the results match well those reported in the literature: well-liked students scored low on aggression (given) and high on prosocial behaviour (given). Prosocial behaviour was more strongly (positively) associated with likeability than (negatively) associated with aggression, and aggression

was more weakly (negatively) associated with likeability in girls than in boys (Table 3.1).

Several studies have reported the existence of a negative association between an adolescent's score on *likeability* and her level of *victimization* (Appendix 3.7). One central assumption we wanted to examine in the present study was whether the frequently reported negative correlation between likeability and victimization would also hold up in the current research. This was crucial as we aimed to determine if this relation could be moderated by group-related contextual factors. We found that, at the individual level, the association between likeability and victimization indeed turned out to be negative and statistically significant in both genders (Table 3.1: r^2= .1901 in girls and .1568 in boys). The strength of this link was further confirmed when the correlations between these two variables were run at a group level (N = 269 classrooms: Figure 3.1). In fact, in the present study we found a more consistent pattern than the one reported by Garandeau et al. (2011) in their analysis of the correlation between social preference (likeability in this study) and individual victimization in 46 classrooms of fourth- and fifth-graders.

The strong negative association between peer victimization and likeability reported in so many previous studies indicates that disliked adolescents not only suffer from social rejection and eventually exclusion, but they are also likely targets of aggression from their peers. Whether this socially painful and adverse condition can somehow be attenuated (or heightened) in groups with varying behavioural norms for aggression and for prosocial behaviour, and with varying degree of overall connectedness (density), was the subject of the four hypotheses tested below (see Table 3.3).

3.4.2 Testing the hypotheses: effects of descriptive norms and network density

The first hypothesis we set out to test was whether behavioural norms of *entire groups* (i.e., classrooms) were less influential than the behavioural norms of *specific subgroups within classrooms*; it is known that adolescents (and individuals of all ages for that matter) tend to interact mostly and preferentially only with a subset of peers within larger groups (e.g., their friends, Cobb, 2010; Duffy & Nesdale, 2009; Hartup, 1993; Hartup & Stevens, 1999; Newcomb & Bagwell, 1995; Hruschka, 2010; Rodkin & Ahn, 2009; Siegler, DeLoache, & Eisenberg, 2011), so we reasoned that peers would be more likely to influence and be influenced by the subgroup of peers they interact with more often, are more exposed to, are more salient, or are more liked than by the peers of the class at large. This hypothesis has to do with *the size of the group* of peers whose behavioural norms can potentially influence the negative impact of individual victimization on likeability. Although the effect of classroom-level descriptive norms has been assessed in several studies (Gasser et al., 2017; Jonkman et al., 2009; Laninga-Wijnen, Harakeh, Steglich, Dijkstra, Veenstra & Volleberg, 2017; Mercer et al., 2009; Nesdale & Dalton. 2011; Nesdale et al., 2005, 2008; Peets et al., 2015; Pozzoli et al., 2012; Salmivalli & Voeten, 2004; Sentse et al., 2015), few have actually focused on its potential effects on behaviour-peer status associations (Boor-Klip et al., 2015; Chang, 2004; Isaacs et al., 2013; Karna et al., 2010; Sentse et al., 2007). Chang (2004) also reported that in classrooms where aggression was normative, aggressive peers were better accepted. Sentse et al. (2007) reported that bullying was better accepted in classrooms with high levels of bullying and victimization was also better accepted in classrooms with high levels of victimization. Karna et al. (2010) found that the positive impact of victimization on rejection was strengthened in classrooms where bullying was reinforced. Isaacs et al. (2013) reported that victimized girls were better accepted in

classrooms with lower levels of bullying. Boor-Klip et al. (2015) found that highly (overt) aggressive peers were better liked in classrooms with a high (overt) aggression norm.

And still fewer have been the studies that have directly compared the contribution of behavioural norms of differently sized groups (e.g., entire classrooms versus subgroups within classrooms) to account for between-classroom variation in the impact of behaviour on peer status. In fact, to our knowledge, only the study by Dijkstra, Lindenberg, & Veenstra (2008) has addressed this problem (see also Dijkstra & Gest, 2015). They compared the effect of entire classes' versus the subgroup of most popular peers' behavioural norm for proactive aggression (bullying) on the impact of individual bullying on acceptance and rejection, and found that it was the latter that turned out more influential. They reported that bullying was better accepted when bullying was more prevalent in the subgroup of most popular peers and the opposite was true of rejection. In fact, these moderating effects were not detected either when they analyzed the impact of the subgroup of non-popular peers' behavioural norm for bullying. The results of our analysis lend support to this finding as we also found that when the behavioural norm analyzed was aggression, the norm of the subgroup of most visible adolescents was more influential than the norm of the entire class (Table 3.3). Thus, when aggression was normative in the subgroup of most visible peers, then victimized peers were less disliked, that is, the behavioural norm for aggression of the subgroup of most visible (or popular) peers weakened the negative impact of individual victimization on likeability (Figure 3.4).

A second test of this same hypothesis involved the comparison of the effect of class-level norms for prosociality versus the norms for prosociality of the subgroup of most visible peers (Table 3.3). In this analysis, however, both group norms turned out to

have the same effect of attenuating the negative relation of individual victimization to likeability (Figs. 3.2 and 3.3). That is, when prosocial behaviour is prevalent in the classroom or in the subgroup of most visible (popular) peers, victimized peers are better accepted. Dijkstra & Gest (2015) also showed that peers scored higher on acceptance in classrooms where popular peers had a high prosocial norm.

Our second hypothesis posited that the behavioural norms of the subgroup of most visible peers would be more likely than the norms of the subgroup of most likeable peers to influence the negative association between likeability and peer victimization. This hypothesis thus examined the potential effects of *status type*, namely, *visibility* versus *likeability*, on the potential moderating role of norms for aggression and for prosocial behaviour on the relation of individual victimization to likeability. Previous research has reported that most popular (or visible) peers are more influential than most likeable peers (e.g., Cillessen, 2011). We also found that this was indeed the case in our study as the aggression and the prosocial *visibility* norms weakened the negative relation between likeability and victimization (Figs. 3.3 and 3.4). Thus, the extent that victimized peers were liked (or disliked) was influenced by how normative were aggression and prosocial behaviour in the subgroup of most visible classmates. High levels of prosocial behaviour and aggression by visible (popular) peers attenuated the level of disliking of highly victimized peers. We also found that neither the aggression *likeability* norm, nor the prosocial *likeability* norm had any significant effect on the likeability-victimization association. In other words, the behavioural norms of most likeable peers were less influential than the behavioural norms of most visible (popular) peers. These results lend further empirical support to the notion that visible (popular) peers have greater impact than likeable classmates (Boor-Klip et al., 2015; Dijkstra & Gest, 2015; Shi & Xie, 2012; Shin, 2017).

Our third hypothesis predicted that *prosocial* norms might have a greater effect than *aggression* norms on the likeability-victimization negative association found in this study and in previous research (see above: 3.5.4). Thus, this hypothesis was concerned with the *behavioural domain* of the norms assessed, namely, *aggression* versus *prosocial behaviour*. As already indicated, the foundation for this prediction was not that strong as visibility (or popularity) has been found to be more influential than likeability (this study: see hypothesis 2; see also Cillessen, 2011), and the former is typically more strongly positively associated with aggression than the latter (review in Cillessen, 2011). Moreover, prosocial behaviour is more strongly associated with likeability than with visibility and the correlation with the former is positive, whereas the correlation with the latter is negative. Our results partly confirmed this hypothesis as whereas only the aggression visibility norm influenced this link, however, we found that both the prosocial norm of classrooms as well as that of the subgroup of most visible peers did have a moderating (weakening) effect on the negative impact of victimization on likeability (Figs. 3.2 and 3.3).

The fourth hypothesis investigated the effect of *classroom density* on the negative impact of individual victimization on peer likeability. Density is defined as the relative number of ties between members within a group (Wasserman & Faust, 1994) and provides an index of the group members' mean level of connectivity (maximal when each and every member is connected to every possible partner in the group). Ann et al. (2010) assessed the effect of group density on the relation of aggression and victimization to peer-perceived popularity (visibility in this study) and social preference (likeability in this study) in third- and fourth-graders. They found that mean social preference tended to be greater in classrooms with high density and that the negative impact of aggression on social preference was attenuated in classrooms with high

density. Although our hypothesis was concerned with the effect of classroom density on the negative relation of individual victimization (not aggression) to likeability, and Ann and colleagues (2010) failed to find any significant effect in their analysis, we predicted that a similar weakening effect could be obtained in our analysis. However, the hypothesis was not borne out by the results (Table 3.3). Thus, contrary to our hypothesis, highly victimized peers were more liked in groups with low (not high) density (Fig. 3.5). We also run analyses to evaluate the effect of the interaction between density and the various group norms for aggression and for prosocial behaviour analysed on the negative link between individual victimization and likeability. We found that the link was weakened by the interaction between density and two different prosocial norms, that of the classroom and that of the subgroup of most visible peers (Table 3.3). Thus, highly victimized peers were less disliked in classrooms with a high prosocial norm and a low density (Figure 3.6) and in classes with low density and where the subgroup of most visible (or popular) peers had a high prosocial norm (Figure 3.7). These results are consistent with the finding already described that low density attenuated the negative impact of individual victimization on likeability and add two further insights. First, *prosocial* norms emerge as more influential than *aggression* norms when they are assessed in interaction with group density. Second, norms defined at *classroom-level* and at the level of the *subgroup of most visible (popular) peers* are more influential than norms defined at the level of the *subgroup of most liked peers* when they are assessed in interaction with group density (see also Table 3.2).

Density is one among several other indices of a group' network structure which is throwing new light on the role of contextual factors that individually or in interaction moderate the relations of behaviour to peer status. For example, in hierarchically structured groups (with high embeddedness), highly victimized peers are more disliked

(Ann and colleagues, 2010; Martin-Babarro et al., 2016), highly aggressive peers are more popular and better liked (Garandeau et al., 2011), and levels of bullying are higher (Garandeau et al., 2014).

3.4.3 Victimization, likeability, norm conformity and norm enforcement

This study's central focus is on peer victimization and rejection (or acceptance) at a developmental transition, namely, adolescence, when individuals are particularly preoccupied with their social relations with age-mates and with the social status (dominance, popularity, likeability) they achieve within their peer groups (Cillessen et al., 2011; Cobb, 2010; Rubin et al., 2009; Siegler et al., 2011), and are greatly sensitive to the effects of adverse experiences in the socializing contexts they are bound to navigate (Blakemore & Mills, 2014; Dahl et al., 2018). Importantly, the quality of adolescents' peer relations not only has immediate effects, as indeed they do in adults, but it is also known to have long-lasting and even lifelong consequences. Thus, the experience of being rejected by peers, which so often is also associated with being overtly or relationally victimized (see Appendix 3.7), is known to be associated with a suite of negative outcomes, including internalizing (depression, anxiety, low self-esteem, withdrawn behaviour, loneliness) and externalizing (defiant behaviour, alcohol consumption and substance abuse, antisocial behaviour) problems, social maladjustment, impaired social competence, poor academic achievement and suicidality (Barzilay et al., 2017; Casper & Card, 2016; Ehrenreich et al., 2016; Espelage et al., 2013; Ford, King, Priest, & Kavanagh, 2017; Hawker & Boulton, 2000; Hugues et al., 2016; Kochenderfer-Ladd & Troop-Gordon, 2010; Ladd et al., 2017; Lee & Vaillancourt, 2018; Light et al., 2014; McDougall & Vaillancourt, 2015; Morgado & Vale Dias, 2013; Nakamoto & Schwartz, 2010; Pavri, 2015; Rasalingam et al., 2016; Schwartz et al., 2005; Sentse et al., 2017; Smith & Juvonen, 2017; Spithoven et al.,

2017; Stewart, Valeri, Exposito, & Auerbach, 2018; Strom et al., 2013; Troop-Gordon et al., 2015; Troop-Gordon, 2017; Vaillancourt et al., 2013; Wang et al., 2014; Williford et al., 2012; Wu et al., 2015; Yu et al., 2017).

3.5 Conclusions

The socio-ecological approach (Doll et al., 2004; Espelage, 2014; Espelage & Swearer, 2004; Watling & Neal, 2013) adopted in the present research capitalized on the view that peer relations and peer status within groups is greatly shaped by the group context. Thus, we analysed the potentially moderating effects of behavioural norms for aggression and for prosocial behaviour of groups defined at three different levels, the entire classroom, the subgroup of most visible (popular) peers, and the subgroup of most likeable peers, and of the classrooms' network density. The analyses showed that individual peer victimization was negatively related to likeability, at the individual level, and at the classroom level, and was moderated by the classroom's norm for prosocial behaviour, by the subgroup of most visible peers' norm for prosocial behaviour, and by the subgroup of most visible peers' norm for aggression. Moreover, network density turned out to also be a significant moderator of behaviour-status associations, alone and in interaction with the complete classroom's and the subgroup of most visible peers' prosocial norms.

Altogether, these results underscore the overall importance of group context as a moderating factor of the relation between behaviour and peer status in adolescents. More specifically, they indicate that the norm of prosocial behaviour can be more influential than the norm of aggression, and that the norm of visible (popular) peers can be more influential than the norm of entire classrooms and the norm of most likeable peers.

Appendix 3.1

Correlations between popularity and likeability.

R	Age (year-old)	Source	Observations
.68	8-9	Ahn et al., 2010	
.65	9-10	Ahn et al., 2014	
.42	10-13	Berger & Rodkin, 2012	
-.11	10-12	Berger et al., 2015	
.50	11	Blake et al., 2011	
.37	10-12	Boor-Klip et al., 2015	
.24	14	Cillessen et al., 2014	
.00	11-13	Closson, 2009	Lk vs impact
.54	13	De Bruyn & Cillessen, 2006	
.22	14	Dijkstra & Gest, 2015	
.24	13	Dijkstra et al., 2008	
.64	9-11	Garandeau et al., 2011	
.73	11-13	Heilbron & Prinstein, 2010	
.34	14	Hawley, 2003	
.70	12	LaFontana & Cillessen, 2002	
.62	9-13	Lease et al., 2002	
.32	13	Li & Wright, 2014	
.72	13-15	Litwack et al., 2012	
.50	6-10	Logis et al., 2013	
.22	14	Mayeux, 2014	
.39	14-17	Mayeux & Cillessen, 2008	
.51	9-11	McQuade et al, 2014	
.71	7-9	Neal & Cappella, 2012	
.25	14	Pronk et al., 2016	
.60	13-15	Puckett et al., 2008	
.48&.55	20	Ruschoff et al., 2015	
.59	10-12	Sainio et al., 2011	
.74	10-13	Sandstrom et al., 2016	
.33	14-15	Schwartz et al., 2013	
.51&.44	10-11 & 14-15	Sijtsema et al., 2009	
.33	11-17	Vaillancourt & Hymel, 2006	
.25	17	Van den Broek et al., 2016	
.42	12	Wolters et al., 2014	Acc vs Pp
.11	8-11	Zimmer-Gembeck et al., 2015	Lk vs impact
.15	14	Zwaan et al., 2013	

Pp: popularity; Lk: likeability; Acc: acceptance.

Appendix 3.2

Correlations between aggression and prosocial behavior.

r	Age (year-old)	Source	Observations
-.38	10-13	Berger et al., 2015	
-.17&.42	13-16	Chang, 2004	
-.16	10	Chung-Hall & Chen, 2010	
-.15&-.35	11-13	Closson, 2009	
-.24	10	Dawes et al., 2017	
-.61	13	De Bruyn & Cillessen, 2006	
-.18&-.21	9	Peters et al., 2010	
-.30	10	Schwartz, 2000	
-.14	17	Van den Broek et al., 2016	
-.44	10-12	Boor-Klip et al., 2015	
-.70	12	Wolters et al., 2014	
-.78	16	Woodhouse et al., 2012	
-.32	8-11	Zimmer-Gembeck et al., 2015	
-.06&-.29	9	Troop-Gordon & Unhjem, 2018	
.05&.13	10-13	Berger & Rodkin, 2012	
.02	14	Cillessen et al., 2014	
.21&.46	7-9	Neal & Cappella, 2012	
.21	13-15	Puckett et al., 2008	
.02	14	Sijtsema et al., 2010	

Appendix 3.3

Correlations between aggression and victimization, and prosocial behavior and victimization.

R	Age (year-old)	Source	Observations
.04	8-9	Ahn et al., 2010	Ag vs Vt
.16&.25	12	Casper et al., 2017	Ag vs Vt
.03	10	Dawes et al., 2017	Ag vs Vt
.07	13	De Bruyn & Cillessen, 2006	Ag vs Vt
-.04&.07	13-14	De Bruyn et al., 2010	Ag vs Vt
.04	10-13	Isaacs et al., 2013	Ag vs Vt
.26&.59	9	Kawabata et al., 2014	Ag vs Vt
.39	14	Kendrick et al., 2012	Ag vs Vt
.52&.79	12-17	Lam et al., 2017	Ag vs Vt
.43	8-10	Mercer et al., 2009	Ag vs Vt
.47	7-9	Neal & Cappella, 2012	Ag vs Vt
.47	14	Pronk et al., 2016	Ag vs Vt
.26	9	Rudolph et al., 2010	Ag vs Vt
.19&.28	10-13	Salmivalli & Helteenvuori, 2007	Ag vs Vt
.46	8-9	Schwartz et al., 2008	Ag vs Vt
.19	10	Schwartz, 2000	Ag vs Vt
.14	13	Sentse et al., 2007	Ag vs Vt
.31	16	Woodhouse et al., 2012	Ag vs Vt
.03&.31	9	Troop-Gordon & Unhjem, 2018	Ag vs Vt
-.27	13	De Bruyn & Cillessen, 2006	Ps vs Vt
-.24&-.38	9-10	Griese & Buhs, 2014	Ps vs Vt
-.12	7-9	Neal & Capella, 2012	Ps vs Vt
-.40	16	Woohhouse et al., 2012	Ps vs Vt
-.06&-.32	9	Troop-Gordon & Unhjem, 2018	Ps vs Vt

Ag: aggression; Vt: victimization; Ps: prosocial behavior

Appendix 3.4

Correlations between popularity, aggression, victimization, and prosocial behavior.

r	Age (year-old)	Source	Observations
.12	8-9	Ahn et al., 2010	Pp vs Ag
.17	9-10	Ahn et al., 2014	Pp vs Ag
.26&.33	10-14	Andrews et al., 2016	Prestige vs Ag
.34	10-13	Berger & Rodkin, 2012	Pp vs Ag
.44	10-12	Berger et al., 2015	Pp vs Ag
.18	11	Blake et al., 2011	Pp vs Ag
.12	10-12	Boor-Klip et al., 2015	Pp vs Ag
.34	14	Cillessen et al., 2014	Pp vs Ag
.28	13	De Bruyn & Cillessen, 2006	Pp vs Ag
.18	9-11	Garandeau et al., 2011	Pp vs Ag
.26&.33	12	LaFontana & Cillessen, 2012	Pp vs Ag
.47	6-10	Mayeux, 2014	Pp vs Ag
.16	7-9	Neal & Capella, 2012	Pp vs Ag
.23	12-14	Ojanen & Findley-Van Nostrand, 2009	Pp vs Ag
.13	9	Peters et al., 2010	Pp vs Ag
.76&.88	16	Prinstein & Cillessen, 2003	Pp vs Ag
.22	14	Pronk et al., 2016	Pp vs Ag
.47	13-15	Puckett et al, 2008	Pp vs Ag
.48	10-13	Sandstrom & Cillessen, 2006	Pp vs Ag
.25&.31	11-17	Vaillancourt & Hymel, 2006	Pp&Power vs Ag
.33&.88	9	Waasdorp et al., 2013	Pp vs Ag
-.42	8-9	Ahn et al., 2010	Pp vs Vt
-.17&-.33	10	Dawes et al., 2017	Pp vs Vt
-.56	13	De Bruyn & Cillessen, 2006	Pp vs Vt
-.14	6-13	Meter y Card, 2016	Pp vs Vt
-.43	7-9	Neal & Cappella, 2012	Pp vs Vt
-.27&.32	16	Prinstein & Cillessen, 2003	Pp vs Vt
-.14	8-9	Pronk et al., 2016	Pp vs Vt
-.10	10-12	Sainio et al., 2011	Pp vs Vt
-.28	10-13	Sandstrom & Cillessen, 2006	Pp vs Vt
.36	10-13	Berger & Rodkin, 2012	Pp vs Ps
.12	10-12	Berger et al., 2015	Pp vs Ps
.07&.29	10	Dawes et al., 2017	Pp vs Ps
.15	13	De Bruyn & Cillessen, 2006	Pp vs Ps
.39	12	LaFontana & Cillessen, 2002	Pp vs Ps
.51	7-9	Neal & Capella, 2012	Pp vs Ps
.48	9	Peters et al., 2010	Pp vs Ps
.42	13-15	Puckett et al., 2008	Pp vs Ps
.24	17	Van den Broek et al., 2016	Pp vs Ps
.23	10-12	Boor-Klip et al., 2015	Pp vs Ps
.21	12	Wolters et al., 2014	Pp vs Ps
-.19	14	Cillessen et al., 2014	Pp vs Ps
-.06	11-13	Closson, 2009	Impact vs Ps
-.05	10-13	Sandstrom & Cillessen, 2006	Pp vs Ps

Pp: popularity; Ag: aggression; Vt: victimization; Ps: prosocial behavior

Appendix 3.5

Correlations between likeability and aggression.

r	Age (year-old)	Source	Observations
-.26	8-9	Ahn et al., 2010	Lk vs Ag
-.27	9-10	Ahn et al., 2014	Lk vs Ag
-.26	10-13	Berger & Rodkin, 2012	Lk vs Ag
-.11	10-12	Berger et al., 2015	Lk vs Ag
-.27	11	Blake et al., 2011	Lk vs Ag
-.58	10-12	Boor-Klip et al., 2015	Lk vs Ag
.06	12	Casper et al., 2017	Acc vs Ag
-.17	13-16	Chung et al., 2010	Acc vs Ag
-.11&-.18	12-13	Dijkstra et al., 2008	Acc vs Ag
-.27	9-11	Garandeau et al., 2011	Lk vs Ag
-.24	7-10	Jia & Mikami, 2015	Lk vs Ag
-.15&-.22	12	LaFontana & Cillessen, 2002	Lk vs Ag
-.39	14	Mayeux, 2014	Lk vs Ag
.00	7-9	Neal & Cappella, 2012	Lk vs Ag
-.21	12-14	Ojanen & Findley-Van Nostrand, 2009	Lk vs Ag
-.45	9	Peters et al., 2010	Lk vs Ag
-.29&-.35	16	Prinstein & Cillessen, 2003	Lk vs Ag
-.32	14	Pronk et al., 2016	Lk vs Ag
-.07	13-15	Puckett et al., 2008	Acc vs Ag
.00	8-9	Ruschoff et al., 2015	Acc vs Ag
-.46&-.52	20	Sandstrom & Cillessen, 2006	Lk vs Ag
-.15	8-9	Schwartz, 2000	Acc vs Ag
-.13	8-9	Sentse et al., 2015	Acc vs Ag
-.19&-.24	10-15	Sijtsema et al., 2009	Lk vs Ag
-.23&-.28	11-17	Vaillancourt & Hymel, 2006	Lk vs Ag
-.36	17	Van den Broek et al., 2016	Lk vs Ag
-.12&-.17	9	Waasdorp et al., 2013	Lk vs Ag
-.50	12	Wolters et al., 2014	Acc vs Ag
-.46	16	Woodhouse et al., 2012	Lk vs Ag
-.29&-.30	8-11	Zimmer-Gembeck et al., 2005	Lk vs Ag

Lk: likeability; Acc: acceptance; Ag: aggression

Appendix 3.6

Correlations between likeability and prosocial behavior.

R	Age (year-old)	Source	Observations
.32	10-13	Berger & Rodkin, 2012	Lk vs Ps
.63	10-12	Boor-Klip et al., 2015	Lk vs Ps
.29	13-16	Chang, 2004	Acc vs Ps
.56	10	Chung et al., 2010	Acc vs Ps
.23	11-13	Closson, 2009	Lk vs Ps
.55	12	LaFontana & Cillessen, 2002	Lk vs Ps
.40	10	LaFontana & Cillessen, 1998	Lk vs Ps
.52	7-9	Neal & Capella, 2012	Lk vs Ps
.56	9	Peters et al., 2010	Lk vs Ps
.49	13-15	Puckett et al., 2008	Lk vs Ps
.71	20	Ruschoff et al., 2015	Acc vs Ps
.50	10-13	Sandstrom & Cillessen, 2006	Lk vs Ps
.24	17	Van den Broek et al., 2016	Lk vs Ps
.56	12	Wolters et al., 2014	Acc vs Ps
.64	16	Woodhouse et al., 2012	Acc vs Ps
.60	8-11	Zimmer-Gembeck et al., 2005	Lk vs Ps

Lk: likeability; Acc: acceptance; Ps: prosocial behavior

Appendix 3.7

Correlations between likeability and victimization.

r	Age (year-old)	Source	Observations
-.31	8-9	Ahn et al., 2010	Lk vs Vt
-.56	13	De Bruyn & Cillessen, 2006	Lk vs Vt
.44	10-13	Isaacs et al., 2013	Rej vs Vt
-.19	7-10	Jia & Mikami, 2015	Lk vs Vt
.51	9-11	Karna et al., 2010	Rej vs Vt
-.24	9	Kawabata et al., 2014	Acc vs Vt
-.25	6-12	Meter & Card, 2016	Lk vs Vt
-.36	7-9	Neal & Capella, 2012	Lk vs Vt
-.31&-.55	16	Prinstein & Cillessen, 2003	Lk vs Vt
-.23	14	Pronk et al., 2016	Lk vs Vt
-.13	10-12	Sainio et al., 2011	Acc vs Vt
-.34	10-13	Sandstrom & Cillessen, 2006	Lk vs Vt
.80	14-15	Schwartz et al., 2013	Rej vs Vt
-.18	10	Schwartz. 2000	Acc vs Vt
-.27	13	Sentse et al., 2007	Lk vs Vt
.42	8-9	Serdiouk et al., 2015	Rej vs Vt
-.40	16	Woodhouse et al., 2012	Acc vs Vt

Lk: likeability; Acc: acceptance; Rej: rejection;

CHAPTER 4: GENERAL DISCUSSION AND CONCLUSIONS

4.1 General discussion

4.1.1 Prosociality and inhibitory control

Did young children altruistically share in the Dictator Game?

In the one-shot DGs run in our first study, 44% of the 4 to 6 year-old young children participants did donate to their anonymous and unrelated partners at least one of the 10 candies (rewards) they had been endowed with. Although DGs and other related experimental tasks have been frequently used to assess altruistic (costly) sharing in samples of non-adult individuals (for example, Benenson et al., 2007; Benozio & Diesendruck, 2015; Blake & Rand, 2010; Blake et al., 2015; Blake, Corbit, Callaghan, & Warneken, 2016; Fehr et al., 2008; Garon, Johnson, & Steeves, 2011; Gummerum, Keller, Takezawa, & Mata, 2008; Gummerum, Takezawa, & Keller, 2009; Gummerum, Hanoch, Keller, Parsons, & Hummerl, 2010; Harbaugh & Krause, 2000; House, Henrich, Brosnan, & Silk, 2012; House et al., 2013; Kogut, 2012; Korenok, Millner, & Razzolini, 2012; Lucas, Wagner, & Chow, 2008; Malti, Keller, Gummerum, & Buchmann, 2009; McAuliffe, Raihani, & Dunham, 2017; Pradel, Euler, & Fetchenhauer, 2009; Rochat, et al., 2009; Schmidt & Sommerville, 2011; Ulber et al., 2016; for reviews see: Engel, 2011; Ibbotson, 2014; Blake, 2018; Blake, McAuliffe, & Warneken, 2014), fully detailed comparisons across studies are sometimes hampered owing to differences in the research questions addressed, in the experimental protocols adopted, and, importantly, in the details provided on the results (Ibbotson, 2014; Krause, 2008). The following are good examples of this situation: of the studies just listed few reported information on how many participants shared at all and most of which did provide that information varied in one or several non-trivial experimental conditions.

Benenson et al. (2007) ran one-shot, anonymous DGs with children aged 4, 6, and 9 year-old and found that the percentage of children that gave some sticker(s) to their anonymous classmates increased with age. They reported that 58% of 4 year-olds, 77% of 6 year-olds, and 85% of 9 year-olds donated at least some sticker. Blake & Rand (2010) also ran one-shot, anonymous DGs with 3 to 6 years-old children and found that the proportion of dictators that donated at least one sticker increased with age from about 42-51% at the youngest age (i.e., 3 year-olds) to 68-92% at the oldest age (i.e., 6 year-olds). In this study, sticker value was dichotomized in high versus low, and in each age, the highest figure refers to donations of low-value stickers. Gummerum et al. (2010) reported that the proportion of children who donated zero stickers in the one-shot, anonymous DGs they ran in their study decreased with age, from about 41% in 3 year-olds to about 38% in 4 year-olds to about 9% in 5 year-olds. Kogut (2012) had children from three age groups, 5-6 year-olds, 7-8 year-olds, and 9-10 year olds, play one-shot, anonymous DGs in which they had to divide 10 candies between themselves and others (from the same versus a different class). Kogut found that the percentage of children who did share some candy increased linearly with age: from 52.6% at the youngest age group to 76.2% at the oldest age group. Liu et al. (2016) studied the relation of inhibitory control and theory of mind (see below) to altruistic sharing in children aged 3 to 11 years. They also found that the proportion of sharers increased with age, starting at 48.10% in 3-5 year-olds and reaching 98% in 9-11 year-olds.

So, the figures on the proportion of children who actually donated at least one candy in the present research compare reasonably well to what has been reported in other studies. Although 56% of children in our study behaved like self-interested rational maximizers, as they gave up nothing, there were, however, 44% who did offer at least one candy to their partners, in spite of the fact that, according to the

experimental protocol used, they did not risk negative reciprocation or retaliation (as the game was one-shot) and reputation effects were not involved either (as the game was played anonymously). In a meta-study of DGs that included 616 treatments with adult individuals, Engel (2011) reported that the average percentage of participants who shared at all was 64% (so, 36% behaved selfishly to the point of giving nothing).

Were young children egalitarian?

In our study there were 56% of children who did not donate a single candy (non-sharers) in the DG. The other 44% who did give up some candies (sharers) contributed 3.3 candies on average (range 1 to 6). Altogether, including sharers and non-sharers, the average contribution in the sample of children studied here was of 1.6 candies (i.e., 16%). The study of egalitarianism, inequality aversion or fair resource allocation, that is, the allocation of equal splits to the self and to the interaction partner, has been undertaken with standard (one-shot, anonymous) DGs and with modified DG versions that involve forced-choice formats, such as the prosocial game (1,1 versus 1,0), the envy game (1,1 versus 1,2) and the sharing game (1,1 versus 2,0) (e.g., Fehr et al., 2008, 2013; House et al., 2012, 2013; Moore, 2009; Sparks, Schinkel & Moore, 2017). Some DG studies have incorporated several additional variables. For example, several researchers have compared prosocial sharing towards partners varying in social distance, i.e., in-group versus out-group members, or friends versus non-friends versus strangers (Benozio & Diesendruck, 2015; Fehr et al., 2008, 2013; Garon et al., 2011; Gummerum et al., 2009; Kogut, 2012; Moore, 2009; Sparks, Schinkel, & Moore, 2017), in face-to-face (non-anonymous) and public settings (Blake & McAuliffe, 2011; Blake et al., 2015; Brownell et al., 2009; House et al., 2012; Rochat et al., 2009; Sebastián-Enesco et al., 2013), with resources varying in level of value to the participants (Blake & Rand, 2010; Garon et al., 2011; Rochat et al., 2009; Schmidt & Sommerville, 2011),

with information about the other player's choice of amount shared (Gummerum et al., 2009), with recipients also receiving an endowment (Korenok, Millner, & Razzolini, 2012), with recipients described as needy (Ongley, Nola, & Malti, 2014), or with participants being rewarded, praised or given a neutral response (Ulber et al., 2016), among others.

Benenson et al. (2007) reported that the average amount of stickers increased with age, from about 28% in 4 year-olds to about 32% in 6 year-olds to about 35% in 9 year-olds. Fehr et al. (2008) had children of 3-4, 5-6 and 7-8 year-old play prosocial, envy, and sharing games and reported that their choice of the egalitarian option (1/1) increased with age. At the youngest age group, only 8.7% of children shared (in the sharing game). This increased to 22% for 5-6 year-olds and to 45% for children at the oldest age group. Gummerum et al. (2008) reported that their participants, aged 8, 11, 13 and 16 years, allocated on average 35-40% of their coins to the other player. In Lucas et al. (2008) study of 4-5 year-old children, dictators gave on average 39.9% of their stickers, and 27% made a fair offer (i.e., half of their endowment). Rochat et al. (2009) used an iterated and non-anonymous version of the DG in which children from seven different cultures aged 3 and 5 years were given collections of goods either even or odd in number and asked to distribute them between themselves and their partners. They reported that although non-egalitarian options decreased with age, they still prevailed in 5 yea-olds and all cultures. Malti et al. (2009) found that the children in their DG study, aged 6 years, gave an average of about 26-28.8% stickers to their partners. Gummerum et al. (2009) reported that 7 and 11 year-old children allocated on average 42% of their coins to the other player. Gummerum et al. (2010) reported that children, aged 3, 4 and 5 years, allocated on average 33.7% of their stickers to the other player. Blake & Rand (2010) found that their children, from 3 to 6 years of age, donated

about 50% of their low value stickers and about 40% of their high value stickers, with no noticeable difference across the four age categories analysed. House et al. (2012) ran the three games previously used by Fehr et al. (2008), i.e., the prosocial game, the costly sharing game, and the envy game, to study fairness in children of three age groups, 3-4, 5-6, and 7-8 years-old, and found that on average they chose the egalitarian option (1/1) above 50% of trials. Kogut (2012) found that 37% of 3-4 year-olds, 52% of 5-6 year-olds, and 36% of 7-8 year-olds gave half of their candies. The youngest gave an average of 18.9%, the intermediate age group gave 32.2%, and the oldest children shared 32.7%. In another DG study of sharing behaviour of 6, 7 and 8 years-old children, Malti et al. (2012) found that on average they offered between 41-49% of their stickers to their anonymous interaction partners. In another developmental study, this time involving six societies highly diverse in culture, geography, and subsistence strategies, and a wider age range, from 3 to 14 years of age, House et al. (2013) reported an age-related U-shaped distribution of egalitarian choices. In another study involving children and adolescents aged 8-17 years and their performance in (non-costly) prosocial, (costly) sharing and envy games, Fehr, Glätzle, & Sutter (2013) reported that the egalitarian choice increased monotonically with age in the non-costly prosocial game (from 54% to 90%). With regards to the costly sharing game, which involved a choice between two discrete offers, 1/1 (fair split) versus 2/0 (unfair advantageous split), only 10% of participants chose on average the fair split over the unfair option. Ongley et al. (2014) ran DGs with 4 and 8 years-old children and reported that they donated an average of 27% and 53%, respectively. Smith, Blake, & Harris (2013) assessed altruistic sharing of 4 stickers in children aged 3-4, 5-6, and 7-8 years, and found that their average number of stickers donated was 12.5%, 28.75%, and 42.75%, respectively. In their DG study of altruistic sharing in 3 to 11 year-old children, Liu et al. (2016) reported that the average

amount of stickers shared increased with age, i.e., 17.2%, 30% and 39.6%, although the differences between the three age groups compared was no longer significant when the analysis included only children who gave at least one sticker (the sharers).

We can see, from this short review of the literature on egalitarian allocation of resources, that variation across studies in levels of fair splits (i.e., fairness) is very large. Since variation in experimental conditions is also important one can assume that perhaps they are related. Nevertheless, there seem to emerge two reasonably robust trends: fully fledged inequity aversion, that is, aversion to unfair, but advantageous splits (1) takes time to develop and (2) is attained by 7-9 years of age (Benenson et al., 2007; Blake & McAuliffe, 2011; Blake & Rand, 2010; Fehr et al., 2008; Gummerum et al., 2010; Malti et al., 2012; McAuliffe et al., 2017; Smith, Blake, & Harris, 2013; see, however, Gummerum et al., 2008; House et al., 2012, 2013; Kogut, 2012; for reviews see: McAuliffe et al., 2017; Warneken, 2018). In Ibbotson's (2014) meta-analysis of DGs in participants from 3 to 18 years of age, he reported that the average offer in standard one-shot, anonymous DGs was 27% in Western samples versus 35% in non-Western samples. This pattern closely matches the one reported for adults. For example, in Engel's (2011) meta-study of 616 treatments with adult participants, he found that dictators gave away an average of 28.35%, and only 16.7% of participants chose the equal split option. Indeed the average proportion of resources shared in DGs in adult samples is highly variable, i.e., from 26 to 47%, a pattern of variation that has been related to cultural differences, for example, in market integration, community size, religion, income, wealth, and household size (Henrich et al., 2010; see also Henrich et al., 2005, Henrich, Heine, & Norenzayan, 2010). Studies on children and adolescents have shown that the propensity to share equally is also greatly affected by the cultural

context (Blake et al., 2015; Blake et al., 2016; House et al., 2013; Ibbotson, 2014; Rochat et al., 2009).

When we compare the average percentage of the endowment that children in our study shared with their anonymous partners to the corresponding figures reported in other studies the conclusion we arrive at is that their sharing propensity was rather far from egalitarian, i.e., 16% in our study versus 50% in a hypothetical egalitarian allocation. Nevertheless, if we consider only the average altruistic sharing of those who did donate at all (44%), the new figure that emerges shows that sharers were on average rather generous since they gave 33% of their endowment, still far from the fair split, though. In any case, the two figures fall within the wide variation range reported in other studies for young children of that age range.

Was altruistic sharing related to inhibitory control?

This was the core question in the present study. Our working hypothesis was that these two variables would be positively related and the results confirmed the prediction: 4-6 years-old children who scored higher on inhibitory control, assessed with the day/night task (Gerstadt et al., 1994), gave away more candies in one-shot, anonymous Dictator Games. Although several studies have tackled this issue before, they vary notably in a number of variables, including the age of participants, the way inhibitory control was assessed, and whether it involved the assessment of cool or hot inhibitory control, and the way prosocial behaviour was measured (Blake et al., 2015; Ciairano et al., 2007; Colasante et al., 2014; Colmenares et al., 2019; Gianotta et al., 2011; Gaillot et al., 2012; Hao, 2017; Kanacri et al., 2013; Liu et al., 2016; Martinsson, Myrseth, & Wollbrant, 2012; Martinsson, Myrseth, & Wollbrant, 2014; Myrseth, Riener, & Wollbrant, 2015; Smith et al., 2013; see also Martín-Babarro et al., 2014).

Ciairano et al. (2007) examined the relation between inhibitory control and cooperative behaviour in children aged 7, 9 and 11 years. Their measure of inhibitory control was the Stroop task (a high value means a poor level of inhibitory control), and prosociality was assessed using a collaborative puzzle task. The latter does not actually measure altruistic sharing, but collaboration, that is, the participants' ability to coordinate their actions so that they can solve the task together and access the reward. They found a positive relation between inhibitory control and collaborative (not altruistic) behaviour. Using a very similar experimental setting (Stroop task and collaborative puzzle), Giannotta et al. (2011) tested the relation between inhibitory control and collaboration in 8, 10 and 12 year-olds. They found a positive association between both variables. Gaillot et al. (2012) related self-control, assessed as trait and as state, to prosociality in undergraduate (adolescent) students. They tested the hypothesis that participants high on trait self-control (via the Stroop task) and cognitively non-depleted would be less likely to break social norms and regulations. The latter was their measure of prosociality. The predictions were supported by their results. In Kanacri et al.'s (2013) longitudinal study of prosociality and effortful control (a component of temperament, see Rueda, 2012), which included assessment of attention and inhibitory control skills in adolescents from 13 to 21 year-old, the former was self-reported and the latter teacher-reported. The researchers found a U-shaped relation between both constructs and reported that individuals high on effortful control tended to decline less with age in their levels of prosociality. Colasante et al. (2014) investigated if inhibitory control was related to guilt and reparative behaviour in 4 and 7 year-old children. Children's inhibitory control and guilt were parent-rated using standard scales. The authors found that reparative behaviour was positively related to inhibitory control, guilt, and age. Martinsson, Myrseth, & Wollbrant (2012) tested the hypothesis that

when facing a social dilemma, individuals may experience a self-control conflict between short-term temptation to be selfish and better judgment to act prosocially. They used a DG and a Public Goods Game (PGG), manipulated the likelihood that individuals identified self-control conflict, and assessed their trait ability to implement self-control strategies. The results confirmed their hypothesis since a positive and significant correlation was found between prosocial behaviour and trait self-control in the condition that raised the likelihood of perceiving conflict (see also Martinsson, Myrseth, & Wollbrant, 2014). Myrseth, Riener, & Wollbrant (2015) also tested the same hypothesis using a PPG to assess prosocial behaviour, psychometric scales to evaluate self-control and impulsivity, and monetary rewards which could be abstract (numbers on-screen) or tangible (tokens or cash). They found that cooperation was more strongly positively related to self-control and more strongly negatively related to impulsivity when the money offered was tangible. Smith et al. (2013) investigated the so-called behaviour-knowledge gap in 3-4, 5-6, and 7-8 year-olds. They found that the gap between what children share in a DG, what they say they (and others) should share (equal split), and what they anticipate they (and others) would share does no close until they turn 7-8 years of age. And this gap was not related to poor inhibitory control, as assessed via the Day-Night Task and the Bear-Dragon Task. Quite the opposite result was found in a study by Blake et al. (2015) of this gap between what children aged 6 to 13 years believed should be split in a hypothetical DG and what they shared when playing an actual DG. In addition to supporting the closing of the gap with age already mentioned, they reported that children with better inhibitory control and better attentional skills proved more generous in the sharing of resources.

Reparative behaviour is regarded as a category of prosocial behaviour that leads to mutually rewarding outcomes, guilt reduction for the transgressor and comfort for the

victim. Liu et al. (2016) studied the relation of inhibitory control and theory of mind (see below) to altruistic sharing in children aged 3 to11 years. Inhibitory control was evaluated with the Day-Night task (in young children) and the Stroop Colour-World Test (in older children), whereas altruistic sharing was evaluated with a DG. They ran several analyses, for example, with and without participants who did not share at all (non-sharers), and no significant relation between inhibitory control and altruistic sharing was found; in fact, they reported that the children who shared three stickers had a lower inhibitory control than did those who shared any other amount of their endowment. In Hao's (2017) study, pre-schoolers 3 and 5 year-old and elementary school children 7, 9, and years-old were assessed for inhibitory control and altruistic giving. Hao assessed cool and hot inhibitory control via a Stroop task and a delay of gratification task, respectively. The altruistic giving task used resembled a Dictator Game. They found that altruistic giving was positively related to inhibitory control in elementary school children, but not in pre-schoolers. Interestingly, among elementary school children, the positive association held only in 2th and 6th graders, but not in 4th graders. Furthermore, in 2nd graders the association between donating behaviour and inhibitory control involved the cool type (Stroop task), whereas in the 6th graders the inhibitory control involved was the hot type (delay of gratification).

Martín-Babarro et al. (2013) assessed prosocial behaviour and impulsivity in 12.7 year-olds via questionnaires. They found that this relation was negative. Also using a survey questionnaire on 20 years-old adolescents, Colmenares et al. (2019) evaluated several forms of prosocial behaviour, including altruistic sharing, in hypothetical (not actual) Dictator (and other economic) Games and hypothetical (not actual) real-life scenarios and trait self-control and impulsivity via standard scales. They reported that

DG altruistic sharing was positively related to self-control and negatively related to impulsivity.

Recently, Blake (2018) reviewed the literature on the knowledge-behaviour gap for altruistic sharing and concluded that the evidence about the involvement of inhibitory control is mixed. In fact, the literature on this topic that we have surveyed above indicates that most studies have found evidence that inhibitory or self-control skills are positively related to altruistic sharing in the DG, including the present study (see Blake et al., 2015; Ciairano el al., 2007; Colasante et al., 2014; Colmenares et al., 2019; Gaillot et al., 2012; Giannotta et al., 2011; Hao, 2017; Kanacri et al., 2013; Martinsson et al., 2012, 2014; Myrseth et al., 2015). Indeed, some studies have failed to find this positive association (Liu et al., 2016; Smith et al., 2013), and at least one has found a negative relation (Liu et al., 2016).

Kocher et al. (2017) used a Public Goods Game (PGG) to examine the relation between self-control and prosocial behaviour. They found that there was a positive association between the two variables, stronger when the participant's risk aversion was low and the cooperation levels of the other players were high. In studying the relation between these two constructs, Kocher et al. (2017) reviewed the literature with regards to three conceptualizations of self-control: time preferences (more impatient individuals contribute less), intuitive versus reflective responses, and trait self-control. Taken together, Kocher et al. (2017) concluded that the results reported in the reviewed literature are generally consistent with the notion that self-control is positively associated with cooperation.

Since in the present study we did not address the relation of decision times or depletion of cognitive resources to prosocial behaviour, here we will not go into that

area. Nevertheless, it seems pertinent to note that ego depletion studies, a way of evaluating *state* inhibitory control, have generally supported the view that a transient shortage of self-control resources is negatively associated with several measures of prosociality (Achtziger, Alós-Ferrer, & Wagner, 2015; Balliet & Joireman, 2010; DeWall, Baumeister, Gailliot, & Maner, 2008; DeBono, Shmueli, & Muraven, 2011; Gailliot, Gitter, Baker, & Baumeister, 2012; Gino, Schweitzer, Mead, & Ariely, 2011; Halali, Bereby-Meyer, & Ockenfels, 2013; Osgood & Muraven, 2015; Xu, Bègue, & Bushman, 2012), a trend that is consistent with the generally positive relation that has been reported between *trait* inhibitory control and prosociality, as described above. It must be noted, though, that several studies have reported a positive relation (Dreber, Fudenberg, Levine, & Rand, 2014, 2016; Schultz, Fischbacher, Thöni, & Utikal, 2011) or a null relation (Hauge, Brekke, Johansson, Johansson-Stenman, & Svedsäter, 2009) between cognitive load and prosociality.

The ability of theory of mind or ToM (i.e., attribution to and understanding of other' mental states) is thought to be related to executive function (Bellagamba et al., 2011; Bradford, Jentzsch, & Gomez, 2015; Chasiotis et al., 2006; Xie, Pei, & Su, 2019), so the relation of theory of mind to prosocial behaviour has also been examined and the findings reported are mixed (for a review see Blake, 2018). Thus, some studies have found that this relation is positive (Takagishi et al., 2010; Wu & Shu, 2014; Yu et al., 2016), whereas others have found a negative relation (Cowell et al., 2015; de Vries, 2015; Lucas et al., 2008; Rochat et al., 2009; Sally & Hill, 2006) or no relation (Burkart & Rueth, 2013; Liu et al, 2016; see also Blake, 2018).

Takagishi et al. (2010) used a non-anonymous PPG, not a DG, so their fairness-related behavioural measure may reflect fear of rejection (retaliation) and reputational concerns (Engelmann & Rapp, 2018; Hackel & Zaki, 2018; Heyes et al., 2015; Kelsey

et al., 2018; Warneken, 2018) rather than genuine altruism. In Yu et al.'s (2016) study, the children's sharing behaviour was positively related to ToM skills, but only when the children interacted with strangers, not their friends.

4.1.2 Peer status, prosocial behaviour, groups norms and network density

Peer status: Was visibility related to likeability?

This was Study 2's first assumption as this was critical to one of the core objectives and hypotheses addressed in the present study, namely, that the visibility norms would prove more influential than the classroom norms and the likeability norms. Previous work has shown that visibility (or popularity) and likeability tend to be moderately positively correlated, and that this correlation is likely to decrease during mid-adolescence (Cillessen, 2011; Cillessen & Mayeux, 2011; for a full list of relevant references and details see Appendix 3.1). The answer to this first question was no; in the present study we found no correlation between visibility and likeability in boys and a low positive correlation in girls. Although this result departed to some extent from the modal pattern reported in previous studies, however, it provided us with a good opportunity to test some of the hypotheses tackled in the current work as they sought to unravel the potentially moderating effects of norms defined at different grouping levels (entire classroom, subgroup of most visible peers and subgroup of most likeable peers). Of course, this low to null correlation between the two constructs could also be due to the fact that we used visibility rather than popularity status. Although they have been shown to be empirically correlated and conceptually related (Cillessen & Marks, 2011), it is conceivable that it may still have had some effect in this study in giving rise to a lower correlation than usual between popularity and likeability. This finding strengthens the view that although these two constructs can be related, which was not the case in our

study, they still capture different dimensions of peer status: being popular among your peers and being liked by your peers.

Prosocial behaviour, aggression, and victimization: What were the links?

Based on previous research (e.g., Berger et al., 2015; Boor-Klip et al., 2015; Dawes et al., 2017; Van den Broek et al., 2016; Wolters et al., 2014; Zimmer-Gembeck et al., 2015; for a full list of relevant references and details see Appendices 3.2 and 3.3), we predicted that prosocial behaviour would be negatively associated with aggression and victimization, and that these two behavioural categories would in turn be positively associated. The prediction regarding these three correlations was borne out by the results of the analyses. This pattern of correlations, which mirrors what has generally been reported in studies of peer relations in adolescents, raises two reflections. First, it appears that individuals who score high on acting aggressively tend to also score high on the recipient end of aggression, that is, victimization. In other words, some adolescents engage in aggressive interactions, as actors as well as receivers, perhaps as a major strategy to build and maintain their peer popularity status and their social relationships more generally (Cillessen, 2011; Lease et al., 2002; Hawley, 1999; Hawley et al., 2007). Second, although a number of studies have described the so-called bi-strategic profile, namely, adolescents who use both aggression as well as prosocial behaviour as components of their way of acquiring and maintaining high peer status in their groups (Hawley, 1999; Hawley et al., 2007; Lease et al., 2002), in this study both behavioural components were negatively related. The negative correlation between aggression-related measures and prosocial behaviour observed in many studies of adolescents' peer relations (see Appendix 3.2) might also be seen as supporting the dichotomization of behaviour in prosocial versus antisocial (i.e., aggression), which is quite common in developmental psychology and psychology more generally (Eisner &

Malti, 2015; Malti & Rubin, 2018b). We should keep in mind that aggression can have different functions, some of which can be prosocial, as when individuals negotiate the terms of their relations with others, when individuals protest against an unfair distribution of resources, or when individuals actively engage in the altruistic punishment of norm transgressors (for reviews see Schmidt & Rakoczy, 2019; Tomasello, 2019; Warneken, 2018). We should also be aware that the behavioural contents of peer relations comprise not only aggression and prosocial behaviour, but they should also include affiliative and conciliatory interactions that greatly contribute to the quality of adolescents' relationships and its welfare- and health-enhancing effects (Butovskaya, 2008; Laursen, Finkelstein, & Betts, 2001; Roseth, Pellegrini, Dupuis, Bohn, Hickey, Hilk, & Peshkam, 2011).

Behavioural correlates of peer status: Were prosocial behaviour and aggression related to visibility and likeability?

In our Study 2 we predicted that prosocial behaviour would be more strongly and positively associated with likeability than with visibility and that aggression would be negatively associated with likeability, but positively associated with visibility. This was based on findings from previous research (behavioural correlates of popularity/visibility, for example: Ahn et al., 2014; Andrews et al., 2016; Berger et al., 2015; Boor-Klip et al., 2015; Cillessen et al., 2014; Dawes et al., 2017; Meter y Card, 2016; Pronk et al., 2016; Van den Broek et al., 2016; behavioural correlates of likeability, for example: Berger et al., 2015; Boor-Klip et al., 2015; Jia & Mikami, 2015; Pronk et al., 2016; Ruschoff et al., 2015; Sentse et al., 2015; Van den Broek et al., 2016; Wolters et al., 2014; for a full list of relevant references and details see Appendices 3.4-3.6). The results from the present study echo similar findings reported in the literature. Thus, aggression was positively related to visibility, whereas prosocial

behaviour, in contrast, was positively associated with likeability. In other words, prosocial individuals tended to rank high on likeability, whereas visible individuals were prominent perhaps because they scored high on aggression.

Was likeability negatively associated with peer victimization?

As already highlighted, Study 2 was particularly concerned with the association between likeability and peer victimization. So, we assumed that, as reported in the literature (e.g., Ahn et al., 2010; Isaacs et al., 2013; Jia & Mikami, 2015; Kawabata et al., 2014; Meter & Card, 2016; Pronk et al., 2016; Schwartz et al., 2013; Serdiouk et al., 2015; Woodhouse et al., 2012; for a full list of relevant references and details see Appendix 3.7), this relationship would also turn negative in the present study. And so it did. The strong and widely reported negative association between peer victimization and likeability indicates that disliked adolescents not only suffer from social rejection and exclusion, but they are also likely targets of aggression from their higher status peers. The four hypotheses that we set out to test in Study 2 (see below) were concerned with whether this socially painful and adverse condition could be attenuated in groups with varying behavioural norms for prosocial behaviour and for aggression and with varying degrees of overall connectedness (density). We should keep in mind that social exclusion and peer victimization are associated with internalizing (depression, anxiety, and suicidal ideation) and externalizing (aggressive, disruptive, attention problems, antisocial behaviour) problems, loneliness, and poor academic achievement; effects that tend to be enduring, even lifelong (Casper & Card, 2016; Hawker & Boulton, 2000; Kochenderfer-Ladd & Troop-Gordon, 2010; McDougall & Vaillancourt, 2015; Troop-Gordon, 2017).

Classrooms' versus subgroups within classrooms' descriptive behavioural norms

We predicted that peers would be more likely to influence and be influenced by the subgroup of peers they interact with more often, are more salient, or are more liked than by the peers of the class at large. This hypothesis focused then on *the size of the group* of peers whose behavioural norms can potentially moderate the negative impact of individual victimization on likeability. The effect of classroom-level descriptive norms has been assessed in several studies (Gasser et al., 2017; Jonkman et al., 2009; Laninga-Wijnen, Harakeh, Steglich, Dijkstra, Veenstra & Volleberg, 2017; Mercer et al., 2009; Nesdale & Dalton. 2011; Nesdale et al., 2005, 2008; Peets et al., 2015; Pozzoli et al., 2012; Salmivalli & Voeten, 2004; Sentse et al., 2015), however, few have actually examined its potential effects on behaviour-peer status associations (Boor-Klip et al., 2015; Chang, 2004; Isaacs et al., 2013; Karna et al., 2010; Sentse et al., 2007), and still fewer have been the studies that have directly compared the contribution of behavioural norms of differently sized groups (e.g., entire classrooms versus subgroups within classrooms) to account for between-classroom variation in the impact of behaviour on peer status (Dijkstra et al., 2008; see also Dijkstra & Gest, 2015).

The results of our analysis showed that when the behavioural norm analysed was aggression, the norm of the subgroup of most visible adolescents was more influential than the norm of the entire class. In other words, when aggression was normative in the subgroup of most visible peers, then victimized peers were less disliked, that is, the behavioural norm for aggression of the subgroup of most visible (or popular) peers weakened the negative impact of individual victimization on likeability (mirroring the findings reported by Dijkstra et al., 2008 study on bullying). In contrast, when the behavioural norm was prosocial behaviour, no difference was found between the effects of the visibility norm versus the classroom-level norm. Thus, when prosocial behaviour

was prevalent in the classroom or in the subgroup of most visible (popular) peers, victimized peers were better accepted (mirroring the findings reported by Dijkstra & Gest, 2015 study on prosocial behaviour and acceptance).

Visibility versus likeability descriptive behavioural norms

Study 2 also examined the potential effects of *status type*, namely, *visibility* versus *likeability,* on the potentially moderating role of norms for aggression and for prosocial behaviour on the relation of individual victimization to likeability. Based on prior work (e.g., Cillessen, 2011), we hypothesized that the behavioural norms of the subgroup of *most visible* peers would be more likely than the norms of the subgroup of *most likeable* peers to influence the negative association between likeability and peer victimization. Our hypothesis was confirmed as both the aggression and the prosocial *visibility* norms attenuated the negative relation between likeability and victimization, whereas neither the aggression *likeability* norm, nor the prosocial *likeability* norm had any significant effect on the likeability-victimization association. That is, high levels of prosocial behaviour and aggression by visible (popular) peers weakened the level of disliking of highly victimized peers. In sum, these results support the notion that visible (popular) peers have greater impact than likeable classmates (Boor-Klip et al., 2015; Dijkstra & Gest, 2015; Shi & Xie, 2012; Shin, 2017).

Descriptive norms for prosocial behaviour versus aggression

We also explored the effect of the *behavioural domain* of the norms assessed, namely, *aggression* versus *prosocial behaviour*. Here we hypothesised that *prosocial* norms might have a greater effect than *aggression* norms on the likeability-victimization negative link found in this study and in previous research (Cillessen, 2011). The results partly confirmed this hypothesis as whereas only the *aggression* visibility norm influenced this link, however, both the *prosocial* norm of classrooms as well as the

prosocial norm of the subgroup of most visible peers did have a weakening effect on the negative impact of victimization on likeability. This is the first study to compare *prosocial* versus *aggression group norms* across two *grouping levels* (i.e., classrooms versus subgroups within classrooms) and across two *status types* (i.e., visibility and likeability). The results indicate that the norms for prosocial behaviour were more influential than the norms for aggression, as its moderating effects involved two grouping levels, i.e., classroom and subgroup of most visible peers; and that visibility norms (for prosocial behaviour and for aggression) were more influential than likeability norms, as the latter did not have any significant effect on the impact of peer victimization on social disliking.

Effect of group's network density

Lastly, we wanted to investigate the effect of *classroom density,* i.e., the relative number of ties between members within a group, on the negative impact of individual victimization on peer likeability. Density indexes the group members' mean level of connectivity. We hypothesised that density would weaken the negative relation of individual victimization (not aggression) to likeability, however, our results failed to support this hypothesis, although they mirrored the findings reported by Ann et al. (2010). Thus, highly victimized peers were more (not less) liked in groups with low (not high) density. In other words, victimized peers were better liked in groups made of multiple, differentiated subgroups or cliques of classmates.

We complemented this analysis with an assessment of the effect of the interaction between density and the various group norms for aggression and for prosocial behaviour analysed on the negative link between individual victimization and likeability. We found that the link was weakened by the interaction between density and the prosocial norms of two grouping levels, the classroom and the subgroup of most visible peers.

This means that highly victimized peers were less disliked in classrooms with a high prosocial norm and a low density and in classes with low density and where the subgroup of most visible (or popular) peers had a high prosocial norm. Importantly, these results shed further light on the weakening effect of low density on the negative impact of peer victimization on likeability. First, they show that *prosocial* norms emerge as more influential than *aggression* norms when they are assessed in interaction with group density. Second, they show that norms defined at *classroom-level* and at the level of the *subgroup of most visible (popular) peers* are more influential than norms defined at the level of the *subgroup of most liked peers* when they are assessed in interaction with group density.

4.1.3 Strengths and limitations

The research tackled in *Study 1* focused on uncovering the potential links between executive functioning, especially inhibitory control, and costly prosocial behaviour in young children. Two strengths of this work were the methods used for assessing trait inhibitory control and altruistic sharing. The Day-Night Task (Gerstadt et al., 1994; Liu et al., 2016; Smith et al., 2013) has proven appropriate to evaluate the ability of young children to control and suppress prepotent responses, and the Dictator Game has become a standard and rather simple task to assess genuine altruistic giving and egalitarianism in resource allocation settings (Blake, 2018; Blake, McAuliffe, & Warneken, 2014; Engel, 2011; Ibbotson, 2014). Since the DG was administered as a one-shot and anonymous game, we could rule out the potential effects of reciprocation, retaliation, and reputation (Engel, 2011; Ibbotson, 2014). The other strength of *Study 1* is the set of results and its original contribution to a better understanding of the psychological foundations of costly prosocial behaviour. In effect, the findings from this study show that altruistic sharing and fairness (equal split of resources) are still

underdeveloped at ages 4-6 years and skills of self-control predict the children's performance in the Dictator Game. The findings thus strengthen the view that fully-fledged altruism takes time to develop in children and provide further support for the view that costly prosocial decisions engage cognitive resources related to self-regulation (Blake, 2018).

Study 1 has some limitations, too. Since prosociality involves several categories of behaviour, for example, collaboration, coordination, non-costly sharing, in addition to costly altruism, it would have been interesting to have carried out a larger-scale experiment, including additional prosocial tasks, for example, the Ultimatum Game, the Public Goods Game or inequity aversion tasks (Halali et al., 2013; House et al., 2013; Kocher et al., 2017; Martinsson et al., 2012; Myrseth et al., 2015), and variable conditions with regards to the number of shots, the anonymity of choices, and the social relation between the players, among others. Also, since the experiment in Study 1 only assessed trait (or cool) inhibitory control, it would have been nice to have implemented tasks involving the manipulation of cognitive load and hot inhibitory control (Hao, 2017).

The research reported in *Study 2* was concerned with testing four hypotheses aimed at elucidating the potentially moderating effects of group context on the negative impact of peer victimization on likeability in a sample of 6,600 13 year-old adolescents from 269 classrooms. Our empirical approach was innovative in that we defined group context along four different dimensions which then were studied via multilevel analysis, a method appropriate for the analysis of nested designs. First, we evaluated the influence of entire classrooms' versus subgroups of peers' descriptive behavioural norms (i.e., norms of *differently sized groups*, i.e., classrooms versus subgroups within classrooms). Second, we assessed the influence of behavioural norms of the subgroups

of most visible (popular) versus most likeable peers (i.e., norms of subgroups defined in terms of *different status types*, visibility versus likeability). Third, we compared the effects of two different behavioural norms, the groups' or subgroups' norms for aggression versus prosocial behaviour (i.e., norms were defined in terms of two *different behavioural domains*, aggression versus prosocial behaviour). Four and lastly, we analysed the effect of classroom's density, alone and in interaction with the other group-level variables, on the impact of victimization on peer likeability (i.e., a parameter of groups' *network structure*).

Another strength of *Study 2* lies in the testing of four assumptions generally relevant in the field, but key in the tests of the hypotheses addressed here: the relations between visibility and likeability, between aggression and prosocial behaviour, between peer status, aggression and prosocial behaviour and, finally, between peer victimization and likeability. The results of the analyses of these assumptions turned our sample into a particularly appropriate one to testing the hypotheses formulated in the present research, especially the finding that visibility and likeability were uncorrelated (or poorly correlated) and the finding that peer victimization and likeability were strongly negatively correlated.

Study 2 had also some limitations worth noticing. First, the approach adopted was correlational; therefore, it can only provide information about patterns of co-variation, not causation. Second, although the peer status construct visibility is widely regarded in the literature as conceptually analogous to popularity (e.g., Cillessen, 2011; Sandstrom, 2011), we did not measure popularity directly, instead visibility was used as a proxy for popularity. Third, although we measured and analysed aggression and victimization as two separate behavioural categories, that is, we coded how many nominations classmates received on the items we used to assess aggression, on the one hand, and

victimization, on the other, which we regard as a strength of our study, however, we did not analyse separately the three forms of victimizations that were actually coded separately, namely, physical, verbal and relational (e.g., Casper et al., 2017). Finally, we did not record information to distinguish proactive/instrumental from reactive aggression (e.g., Card & Little, 2016; Wrangham, 2017), nor proactive aggression from bullying (Volk, et al., 2014). It is important to note, however, that this is a rather common practice in this field despite the fact that there are excellent analyses portraying the conceptual differences between the various categories of aggression and the differences in its developmental stability, its neural and physiological underpinnings, and its causes and consequences (e.g., Berger et al., 2015; Brugman, Elbert, Schauer, & Moran, 2018; Lansford, 2018; Malti & Rubin, 2018a; Smeets et al., 2017).

4.1.4 Future directions and further reflections

Finding ways to overcome the limitations reported in the present research and in many others in the field of study of prosociality would be highly desirable. With regards to the experimental study of the psychological foundations of altruism and prosocial behaviour more generally, that we tackled in *Study 1*, it would be interesting to carry out comprehensive analyses of the relation between executive functioning, theory of mind, and empathy and the various ways in which prosocial behaviour is enacted. Although many of these psychological constructs exhibit trait-related characteristics, they can deploy some variation driven by experiential and situational factors. We have mostly described studies regarding the relation of trait self-control and theory of mind to one of the categories of prosocial behaviour, i.e., altruistic sharing (e.g., review in Blake, 2018), however, it is well established that empathy is strongly positively associated with and motivates prosocial behaviour (Eisenberg, Eggum, & Giunta, 2010; Eisenberg et al., 2016; Liu, Hu, Shi, & Mai, 2018). This means that given that inhibitory control and

empathy can be fostered, shaped, and improved (Alquist & Baumeister, 2012; Blackhart, Nelson, Winter, & Rockney, 2011; Blake et al., 2015; Brownell et al., 2013; Capraro et al., 2014; Drouvelis & Gosskopf, 2016; Hamilton, 2016; Spinrad & Gal, 2018; Steinbeis & Over, 2017; Takagishi et al., 2010), and given the critical contribution of prosocial (and moral) behaviour to the building and maintenance of healthy and fair social relationships and of highly cohesive groups, it appears that much more research on these issues should be strongly encouraged and supported.

With regards to the issues, constructs and hypothesis addressed in *Study 2*, airing some reflections on directions for future work is also appropriate. Although correlational and cross-sectional studies based on data collected via survey questionnaires are common, warranted, and valuable in this field (e.g., Cillessen et al., 2011), the answers to the questions addressed are much more illuminating when they can be complemented with studies based on observational data (Machado, Rinaldi, de Moraes, Levy, & Menezes, 2015), longitudinal designs (Kawabata et al., 2014; Mayeux & Cillessen, 2008; Logis et al., 2013; Sentse et al., 2015; see also Sandstrom et al., 2011), and experimental tasks (Nook et al., 2016; Van den Broek et al., 2016; Vrijhof et al., 2016; see also Sandstrom et al., 2011). Although popularity and likeability have become the two measures of peer status more commonly assessed in this field (e.g., Cillessen et al., 2011), the truth is that different studies often rest on measures of popularity or likeability that have been coded differently. For example, whereas some studies assess likeability (or social preference) as liked most minus liked least scores, others analyse some (or all of) its components separately, that is, acceptance and rejection (e.g., Casper et al., 2017; Dijkstra et al., 2014; Isaac et al., 2013). This situation makes accurate comparisons across studies more difficult and less efficient. It would be interesting to run studies designed to collect the information required to assess

several constructs of peer status, for example, dominance, power, impact, visibility, popularity and likeability in the same sample and to evaluate the extent that they are really providing the same information, not only in terms of how much they correlate with one another, but also of how much they share its behavioural correlates. Future studies should also collect finer-grained measures of prosocial behaviour and aggression, ideally from the same sample, and to provide clear-cut operational definitions so that they can be replicated. Sometimes this does not happen and researchers find it hard to compare results across studies. Ideally, these studies should distinguish aggression given from aggression received, proactive from reactive aggression, bullying from other forms of proactive aggression, and overt from covert forms of aggression, as they have been shown to have different causes and consequences (e.g., Berger et al., 2015; Card & Hodges, 2008; Donoghue & Raia-Hawrylak, 2016; Malti & Rubin, 2018a). Of course, even richer information would be gained if researchers would collect not just how many times individuals are nominated (or rated) as aggressors or victims, but also the identity of their victims and aggressors, respectively (see Closson & Hymel, 2016).

Despite the fact that prosocial behaviour is critical for understanding human ultra-sociality at any developmental period, much early and even ongoing research on the peer ecology of children's and adolescents' peer relations, social standing and behaviour tends to be biased towards the study of aggression, often regarded as antisocial behaviour (Eisner & Malti, 2015; Malti & Bukowski, 2018a). Future work should continue to level off this biased picture of social relations by intensifying research on the role of prosociality in people's everyday life. In this respect, studies based on survey questionnaires should incorporate more items framed in terms that can provide much finer-grained information on the various theoretically relevant categories of prosocial

behaviour. In fact, much of the suggestions made above with regards to the sophistication of the information that needs to be collected on aggression-related measures are equally applicable to the study of prosociality.

Many of the issues and processes relating to prosociality, its psychological underpinnings and the socio-ecological contexts in which prosocial behaviour and group norms are shaped by and shape social relationships and peer status within social groups that matter to developmental, socio-cognitive, and social psychologists are also tackled by comparative psychologists working on nonhuman animals (reviews in Hare, 2017; Tomasello, 2019; Warneken, 2018). The comparative-evolutionary perspective can tell us much on the evolutionary origin and socio-ecological contexts that have driven the observed commonalities and differences across species in characteristics of current prosocial behaviour and of its underlying psychological processes.

From a broader perspective, the results from *Study 2* raise two issues worth commenting. On a theoretical level, the findings from this study confirm the heightened sensitivity of adolescents to behavioural (descriptive) norms, that is, the behaviour prevalent in their reference group. And the key reference groups are typically the subgroup of popular peers or the complete classroom, and not the subgroup of most likeable peers (see also Dijkstra et al., 2008; Dijkstra & Gest, 2015; Sijtsema et al., 2009). Group norms for prosocial behaviour and for aggression are influential as they have been found to moderate the impact of bullying (Boor-Klip et al., 2015; Chang, 2004; Dijkstra et al., 2008; Dijkstra & Gest, 2015; Garandeau et al., 2011; Sentse et al., 2015) or victimization (Ahn et al., 2010; Isaacs et al., 2013; Karna et al., 2010; Knack et al., 2012; Sandrouk et al., 2015; Sentse et al., 2007; this study) on likeability. Thus, for example, entering classrooms with popular peers having a low norm for prosocial behaviour means facing a more adverse socializing scenario where peer victimization is

likely to be more strongly associated with increased rejection. Four characteristics of human groups, whether involving adults or adolescents, are their members' need to belong, the normativity of their behaviour, their drive to conform to group norms, and the propensity to target and ostracize norm deviants (Baumeister & Leary, 1995; Chudek & Henrich, 2011; Fehr & Schurtenberger, 2018; GasserNook et al., 2016; Rand & Nowak, 2013; Sentse et al., 2007, 2015; Underwood & Ehrenreich, 2014). Feeling accepted and liked by the reference group becomes a critical goal for adolescents (and adults more generally), so much so that they are willing to do almost anything to comply with the group's behavioural norms, even if these are regarded as morally questionable (Mulvey & Killen, 2017). Failing to do so place them at risk for rejection and exclusion, which is socially painful and psychologically potentially devastating (Cacioppo & Cacioppo, 2014; Coplan & Bowker, 2014; Eisenberger et al., 2017). In a way, there is a dark side to human ultra-sociality, namely, the in-group versus out-group differentiation (Killen, Mulvey, & Hitti, 2013; Over, 2018; Thornberg et al., 2015); norm deviants will be treated as outgroup individuals and be subjected to active peer victimization or passive stigmatizing.

On a more practical level, studies aimed to identify the group-level at which behavioural norms seem to influence more strongly the behaviour of their individual members, for example, schools (McGuire, Rutland, & Nesdale, 2015; Mucherah, Finch, White, & Thomas, 2018; Saarento et al., 2014; Steffgen, Recchia, & Vietchtbauer, 2013; Strom et al., 2013; Waasdorp et al., 2013; Wang et al., 2013, 2014), friends (Andrews, Hanish, DeLay, Martin, & Updegraff, 2017; Kendrick et al., 2012; Malti, McDonald, Rubin, Rose-Krasnor, & Booth-LaForce, 2015; Schacter & Juvonen, 2018; Shin, 2017), classmates (Bass, Santo, da Cunha, & Neufeld, 2016; Boor-Klip et al., 2015; Dijkstra et al., 2008; McGuire et al., 2015; Saarento et al., 2014, 2015; Thomas,

Bierman, & Powers, 2011; Thornberg, Wänstrom, & Pozzoli, 2016; this study), or popular peers (Cillessen et al., 2011; Dijkstra et al., 2008, Dijkstra & Gest, 2015), are useful to help implement prevention and intervention programmes seeking to mitigate more effectively the negative consequences of behavioural norms that enhance peer rejection and victimization and its associated immediate and potentially long-lasting harmful effects (McDougall & Vaillancourt, 2015; Vaillancourt, Hymel, & McDougall, 2013). Fostering inhibitory control, empathy and prosocial behaviour (Gose, 2011; Saarento et al., 2015; Schacter & Juvonen, 2018; Spinrad & Gal, 2018), discouraging antisocial behaviours (Doll et al., 2004) and changing the behavioural norms for aggression and for prosocial behaviour of appropriate target groups are strategies worth exploring and implementing.

Our theoretical lens, within which the results obtained and its implications were evaluated, sought to zoom out way beyond developmental psychology boundaries. The study of children and adolescents' aggression and prosocial behaviour is critical not only to improve our understanding of the evolved psychology underpinning those behaviours and its contribution to peer relations and social status at those particularly sensitive developmental periods, but it also provides essential information on several hallmarks of human social behaviour and group organization, including their ultra-sociality, behaviour normativity, norm conformity, norm enforcement, and morality. And these issues are a meeting point for researchers working in a variety of disciplines, including educational and developmental psychology, social psychology, comparative psychology, evolutionary psychology, evolutionary anthropology, behavioural economics, and social neuroscience (Baumeister & Leary, 1995, Baumeister, Ainsworth, & Vohs, 2016; Cacioppo, Cacioppo, Capitanio, & Cole, 2015; Coplan & Bowfer, 2004; Ellis, Volk, Gonzalez, & Embry, 2017; Eisenberger, 2015; Fehr &

Schurtenberger, 2018; Forgas, Jussim, & Van Lange, 2016; Hawley, 2003; Killen & Malti, 2015; Malti & Rubin, 2018a; Rand & Nowak, 2013; Silk & House, 2011; Tomasello, 2014, 2016, 2019; Tomasello et al., 2012; Volk, Farrell, Franklin, Mularczyk, & Provenzano, 2016; Wrangham, 2017). We should take much more seriously the implications that derive from the incontestable fact that social relationships impact the incumbent partners' well-being and mental and physical health (Cacioppo & Cacioppo, 2014; Dunbar, 2018; Holt-Lunstad, 2018; Holt-Lunstad, Smith, & Layton, 2010; Loving, Heffner, & Kiecolt-Glaser, 2006; Newman & Roberts, 2013). Scientifically informed programmes that aim to reduce peer victimization, rejection and exclusion should thus be strongly supported. The present research provided empirical support for several key assumptions and for several relevant hypotheses that strengthen and expand our understanding of psychological foundations of prosocial behaviour in young children, and of peer relations, social status and the behaviour-status relations among adolescents. They also add to the growing body of knowledge driven by the socio-ecological approach to the study of social relationships in developmental psychology and the role of prosocial behaviour and aggression in the structuring of peer groups (Bronfenbrenner, 1979; Doll, Song, & Siemers, 2004; Espelage, 2014; Espelage & Swearer, 2004).

4.2 Conclusions

Although sociality and prosociality are ubiquitous in the animal kingdom, humans are claimed to be uniquely ultra-social and ultra-prosocial. The ecological and biological success of humankind is contended to be related to our species' ultra-sociality and this is believed to rely heavily on our hypertrophied prosociality. The present research aimed to probe *prosociality* by studying (1) some of its *psychological foundations* in young children and (2) its role in the *socio-ecological context* of peer relations in young

adolescents' groups. The current work consisted of two studies that tackled a common theme, prosociality, approached from two different but complementary perspectives. *Study 1* was an experimentally investigation of the relation between one form of costly prosociality, namely, *altruistic sharing*, and one component of executive function, namely, *inhibitory control*, in 4 to 6 year-old young children from Colombia. *Study 2* was a correlational investigation of the effect of descriptive behavioural group norms for prosocial behaviour and for aggression, and a group's network density, on the negative impact of peer victimization on likeability in 13 year-old young adolescents from Spain. The most important conclusions from these two studies are as follows:

1. In the one-shot Dictator Games (DGs) run in Study 1, only 44% of the 4 to 6 year-old young participants did donate to their anonymous and unrelated partners at least one of the 10 candies (rewards) they had been endowed with. Given that, according to the experimental protocol used, the children did not risk negative reciprocation or retaliation (as the game was one-shot) and reputation effects were not involved either (as the game was played anonymously), these children qualify as altruists. However, since 56% of children in this study behaved like self-interested rational maximizers, as they gave up nothing, the conclusion one arrives at is that overall, the choice of an altruistic option was rather low. This finding supports the widely reported view that *altruistic sharing*, as assessed in the DG, is underdeveloped at young ages.

2. The average allocation of Study 1's children in the DG was of 1.6 candies (i.e., 16%). This figure includes the zero contributions of the 56% non-altruists and the non-zero contributions of the 44% altruists. If we relax the criterion and only consider the average donations of altruists (those who at least allocated one candy), i.e., 3.3 or 33%, we see that this is still far from a fair split (50%). From this we can conclude that the 4

to 6 year-olds studied here were far from egalitarian in their altruistic sharing, assessed via a DG. Previous research on egalitarianism in young children using DGs and other sharing tasks has reported that the range of variation in percentage of fair splits across studies is rather large. Our results do fall well within that range. At this young age, then, *egalitarian sharing of resources* is still low.

3. The core question addressed in Study 1 was whether *inhibitory control*, one foundational executive function, was related to *altruistic sharing* in a DG. Our working hypothesis was that they would be positively related, and the prediction was supported. We found that 4 to 6 year-old children who scored higher on trait inhibitory control, assessed with the Day-Night Task, gave away more candies in a one-shot, anonymous Dictator Game. This finding suggests that acting altruistically in a DG requires the operation of inhibitory control. This result is consistent with findings from a variety of experiments tackling the relation between self-regulation and cooperation using trait (cool) and state (hot) self-control measures.

4. Study 2 tested the relation between two *peer status* constructs, i.e., *visibility* and *likeability* in 13 year-old young adolescents, and found that they were uncorrelated or poorly correlated. This provided us with a good opportunity to test hypotheses that sought to unravel the potentially moderating effects of behavioural norms defined at different grouping levels. This finding strengthens the view that although these two constructs can be correlated, which was not the case in this study, nonetheless, they capture different dimensions of peer status: being popular among your peers and being liked by your peers.

5. Study 2 found that *prosocial behaviour* was negatively associated with *aggression* and *victimization*, and that these two *behavioural categories* were in turn positively associated in 13 year-olds. This finding supports the widely accepted view

that young adolescents who score high on acting aggressively tend to also score high on the recipient end of aggression, that is, victimization. In other words, some adolescents engage in aggressive interactions, as actors as well as receivers, perhaps as an overall strategy to build and maintain their peer status and their social relationships more generally. Also, the young adolescents from the current study did not deploy a bi-strategic profile (use of both aggression as well as prosocial behaviour as components of their way of acquiring and maintaining high peer status in their groups), as we found that both behavioural components were negatively related.

6. Study 2 reported that *aggression* was positively related to *visibility*, whereas *prosocial behaviour*, in contrast, was positively associated with *likeability* in our large sample of young adolescents. In other words, prosocial individuals tended to rank high on likeability, whereas visible individuals were prominent perhaps because they scored high on aggression. These results echo similar findings reported in the literature and add to the body of data available on the *behavioural correlates* of different components of *social status* in young adolescents.

7. The key assumption in Study 2, namely, that *peer victimization* would have a negative impact on *likeability* in the young adolescents of the study, was strongly supported. The strong and widely reported negative association between peer victimization and likeability indicates that disliked adolescents not only suffer from social rejection and exclusion, but they are also likely targets of aggression from their higher status peers.

8. Study 2 showed that when aggression was normative in the *subgroup of most visible* peers, victimized peers were less disliked, that is, the behavioural norm for aggression of the subgroup of most visible (or popular) peers weakened the negative impact of individual victimization on likeability. In contrast, when prosocial behaviour

was prevalent in the *classroom* or in the *subgroup of most visible* (popular) peers, victimized peers were better accepted. This result highlights the fact that the negative victimization-likeability link in young adolescents can be more sensitive to the behavioural norms of some subgroups of peers within the classroom than to the behavioural norms of the entire group of classmates. In other words, the grouping level matters when studying the potential effect of behavioural group norms on peer status-behaviour associations.

9. Study 2 tested the prediction that *visibility* behavioural norms would be more influential than *likeability* behavioural norms in moderating the negative relation between peer victimization and likeability in young adolescents. This was confirmed as both the aggression and the prosocial *visibility* norms attenuated the negative relation between likeability and victimization, whereas neither the aggression *likeability* norm, nor the prosocial *likeability* norm had any significant effect on the likeability-victimization negative association. That is, high levels of prosocial behaviour and aggression by visible (popular) peers, but not by liked peers, weakened the level of disliking of highly victimized peers. These results support the notion that visible (popular) peers have greater impact than well-liked classmates.

10. Study 2 tested the hypothesis that *prosocial* norms might have a greater effect than *aggression* norms on the likeability-victimization negative link found in this study and in previous research. The results only partly confirmed this hypothesis as whereas only the *aggression* visibility norm influenced this link, however, both the *prosocial* norm of classrooms as well as the *prosocial* norm of the subgroup of most visible peers did have a weakening effect on the negative impact of victimization on likeability. This is the first study to compare *prosocial* versus *aggression group norms* across two *grouping levels* (i.e., classrooms versus subgroups within classrooms) and across two

status types (i.e., visibility and likeability). The results indicate that the norm for prosocial behaviour was more influential than the norm for aggression, as its moderating effects involved two grouping levels, i.e., classroom and subgroup of most visible peers; and that the visibility norms (for prosocial behaviour and for aggression) were more influential than the likeability norms, as the latter did not have any significant effect on the impact of peer victimization on social disliking in our study of 13 year-old young adolescents.

11. Finally, Study 2 investigated the relation of a group's network density and the negative relation of peer victimization to likeability in 13 year-olds. We found that victimized peers were better liked in groups made of multiple, differentiated subgroups or cliques of classmates (i.e., low density). When we assessed the effect on the negative link between individual victimization and likeability of the interaction between density and the various group norms for aggression and for prosocial behaviour analysed, we found that the link was weakened by the interaction between density and the prosocial norms of two grouping levels, the classroom and the subgroup of most visible peers. This means that highly victimized peers were less disliked in classrooms with a high prosocial norm and a low density and in classes with low density and where the subgroup of most visible (or popular) peers had a high prosocial norm. Importantly, these results shed further light on the weakening effect of low density on the negative impact of peer victimization on likeability. First, they show that *prosocial* norms emerge as more influential than *aggression* norms when they are assessed in interaction with group density. Second, they show that norms defined at *classroom-level* and at the level of the *subgroup of most visible (popular) peers* are more influential than norms defined at the level of the *subgroup of most liked peers* when they are assessed in interaction with group density.

Taken together, the present research adds to our understanding of the psychological foundations of prosociality in young children, and of the role of prosocial behaviour (and aggression) in the socio-ecology of peer groups of adolescents. More specifically, the findings reported in the current work indicate that altruistic behaviour and fair allocation of resources, as assessed with a Dictator Game, are underdeveloped in 4 to 6 years-old children, and that the altruistic sharing of resources is positively associated with trait inhibitory control at this young age. They also reveal that prosocial (and aggression) norms, mainly of the subgroup of most visible (or popular) peers, and the classroom's network density moderate the negative impact of peer victimization on likeability. These findings strengthen and expand our understanding of peer relations, social status and the behaviour-status relations in groups of 13 years-old adolescents. The theoretical and applied implications of these results are discussed in the context of the research agendas of several disciplines, especially developmental psychology and comparative psychology. Strengths, limitations, and future directions of the present work and of this field of study are also addressed.

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